

Thirty Two New Species of *Bulbophyllum* (Orchidaceae) from Sulawesi

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Abstract

Thirty two new species of *Bulbophyllum*, all from Sulawesi, are described. Names currently in use for various sections of *Bulbophyllum* are made junior synonyms to older sectional names that have been ignored so far, partly because their taxonomic content, as appears from the suite of species listed with the original descriptions of these sections, was ambiguous. These sectional names are lectotypified and re-instated.

Introduction

Thirty two new species of *Bulbophyllum*, all from Sulawesi, are described. In addition, new definitions of some sections of *Bulbophyllum* are proposed. Averyanov (1994) and Ormerod (2002) have found names prior to those commonly used for several sections of *Bulbophyllum*. While admitting that name changes are a nuisance to many, we felt it would be appropriate to further pursue this line of investigation in order to install a new set of sectional names that, hopefully, will remain stable because they are based on the oldest names available. The oldest source of sectional names (in the genus *Diphyes* Bl., = *Bulbophyllum*, Thou.) is Blume (1825). Often, we were able to choose the taxonomic contents of these names by lectotypification. We have done this in such a way that the number of Blume's names to disappear into synonymy is minimized, particularly in cases where the taxonomic contents of our newly delimited sections does not coincide with the contents of the sections as accepted so far. For instance, sect. *Polymeres*, below, is better not given a name that derives from one of its constituent sections to avoid confusion, because those section names have been accepted and used by consensus since their description by Schlechter (1913).

Most data on the flowering periods of the species described below derive from plants in cultivation.

***Bulbophyllum* sect. *Brachystachyae* Benth. & Hook.f.**

(= genus *Cochlia*, sect. *Globiceps*, genus *Osyricera*, sect. *Saurocephalum*)

Bulbophyllum sect. *Brachystachyae* Benth. & Hook.f., Gen. Pl. 3 (1883) 504. – TYPE SPECIES (a lit. reference given only): *Bulbophyllum* (“*Bolbophyllum*”) *repens* Wall.

Cochlia Bl., Bijdr. Fl. Ned. Ind. (1825) 320. – *Bulbophyllum* Sect. *Cochlia* (Bl.) Benth. & Hook.f., Gen. Pl. 3 (1883) 503. – TYPE SPECIES: *Cochlia violacea* Bl. (= *B. salaccense* Rehb.f.).

Bulbophyllum sect. *Cylindracea* Pfitz. in Engler & Prantl, Nat. Pflanzenfam., ed. 2, 6 (1889) 179. – TYPE SPECIES: *Bulbophyllum* (“*Bolbophyllum*”) *cylindraceum* Lindl.

Bulbophyllum sect. *Saurocephalum* Schltr., Feddes Repert. 10 (1912) 184. – LECTOTYPE SPECIES (here designated): *Bulbophyllum saurocephalum* Schltr.

Bulbophyllum sect. *Globiceps* Schltr., Feddes Repert. Beih., 1 (1913) 875. – TYPE SPECIES: *Bulbophyllum globiceps* Schltr.

Osyricera Bl., Bijdr. Fl. Ned. Ind. (1825) 307. – *Bulbophyllum* Sect. *Osyricera* (Bl.) J.J. Sm., Bull. Jard. Bot. Buitenzorg, Ser. 2, 13 (1914) 35. – TYPE SPECIES: *Osyricera crassifolia* Bl. (= *B. osyricera* J.J. Sm.).

Bulbophyllum sect. *Diptychanthes* sensu Rehb.f. in Bonplandia 5 (1857) 57. – SPECIES MENTIONED: *Bulbophyllum salaccense* Rehb.f.

Not *Diphyes* sect. *Diptychanthes* Bl., Bijdr. Fl. Ned. Ind. (1825) 311. – TYPE SPECIES: *Diphyes mutabilis* Bl. [= *B. mutabile* (Bl.) Lindl., is sect. *Stachysanthes*; see below].

***Bulbophyllum ankylodon* J.J. Verm. & P. O’Byrne, sp. nov.**

A *Bulbophyllo* pubifloro floribus in seriebus 4 circa rhachidem, labello papilloso abaxialiter callo crasso differt. – **Typus:** Indonesia, Sulawesi, central part, SBG-O 4713 (holo, SING). **Fig. 1.**

Roots spreading. **Rhizome** creeping or shortly straggling, 2.5–4 mm diam., sections between pseudobulbs ca 3 cm long, bracts not persistent. **Pseudobulbs** distant, ovoid, 3.5–4.2 x 1–1.4 cm, distinctly but obtusely 3-angled. Petiole 1–1.4 cm long. **Leaf** blade elliptic to obovate, 10–12 x 2.6–3.3 cm, index (length/width) 3.6–3.9; acute. **Inflorescence** patent, a rather dense raceme, 7.5–15.5 cm long, 30–50-flowered. Peduncle 2.5–4 cm, bracts 2 (1 basal),

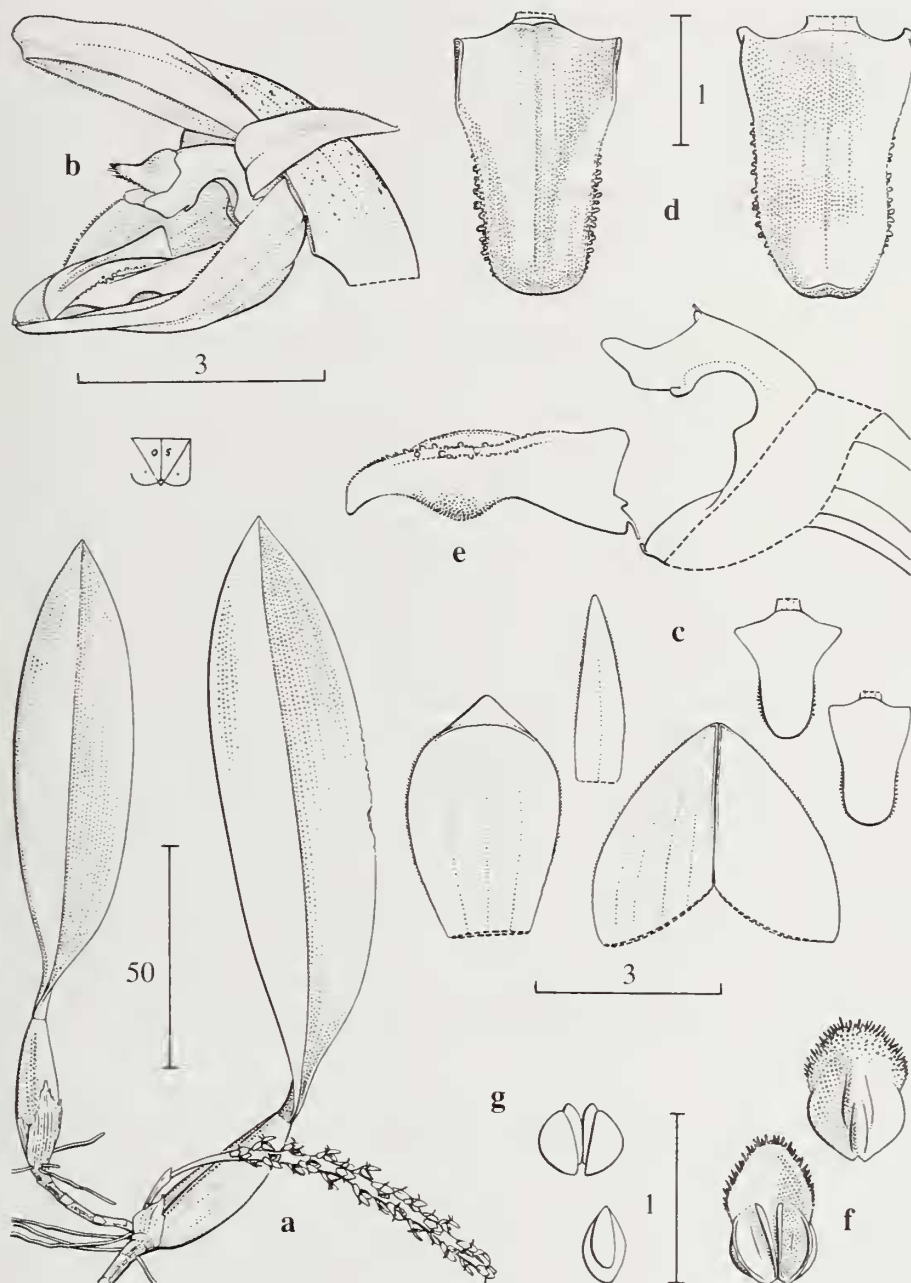


Figure 1. *Bulbophyllum ankylodon* J.J. Verm. & P. O'Byrne. A. Habit; B. Flower; C. Flower analysis, from left to right: median sepal, petal, lateral sepals, lip; D. Lip, left: adaxial side, right: abaxial side; E. Column and lip, lateral view; F. Anther, left: adaxial side, right: abaxial side; G. Pollinia, above: two pairs, below: a single pair. All from SBG-O 4713 (spirit sample).

the longest 5-9 mm long. Rhachis thickened, cylindrical, 5.8-11.5 cm long, 2.5-3.2 mm across. Floral bracts 3-4.2 mm, acute. **Flowers** not resupinate, spirally arranged in 4 rows, not fully opening, many open simultaneously. Pedicel and ovary ca 1.5 mm long, basal node about flush with the surface of the rhachis. Median **sepal** approx. porrect, obovate, ca 4 x 2.6 mm, index 1.5-1.6; top cucullate, rounded, margins entire, papillose-ciliolate, base rather broadly attached; rather thick, 3-veined, surface adaxially glabrous, abaxially shortly papillose-hirsute. Lateral sepals adnate along the lower margins, basal part recurved, top part incurved, oblique, triangular, ca 4.2 x 2 mm, index ca 2.1, top flat, subacute, base broadly attached; 4-veined, otherwise as the median sepal. **Petals** recurved, ovate-triangular, ca 3.2 x 0.8 mm, index ca 4; subacute, margins entire, papillose-ciliolate, base broadly attached; rather thick, 1-veined, surface approx. glabrous. **Lip** slightly curved, general outline subtriangular, ca 2 x 1.3 mm, index 1.5-1.6 (all without artificial spreading, hastate with a drawn out, elliptic midlobe and deltoid, acute sidelobes when spread); rounded, margins entire, coarsely papillose distally; thick; adaxially slightly concave near the base, with 2 rounded ridges starting near the margin at about $\frac{1}{4}$ of the length of the lip and then converging and running up almost to the tip of the lip, adaxial surface finely papillose distally; abaxially without a ridge near the base, but with a rounded lump in the distal half, surface approx. glabrous except for the papillose lump. Column ca 1.5 mm long, stigma without a tooth at its base, column foot with 2 rounded swellings along the margin near its base, and a slight swelling just above the ligament. Stelidia minute, abruptly bent downwards but with an antrorse, approx. acute tip, along the upper margin with a very large (far more conspicuous than the stelidia themselves), antrorse, wedge-shaped wing with a broadly rounded, erose top margin. Anther abaxially with a crest near the base, surface somewhat papillose, front margin drawn out into a triangular, rounded beak, margin coarsely papillose. **Pollinia** 4, the inner much flattened and about as long as the outer, all ellipsoid-ovoid; no appendages present.

Colour: Vegetative parts green, not suffused with red. Rachis densely mottled pinkish purple. Sepals and petals yellowish, veins and margins purplish red. Lip orange yellow, particularly the adaxial surface stained with purplish red. Column yellow.

Habitat & ecology: Epiphyte in mossy montane forest. Alt. ca 1000 m. Flowering Feb, Jul-Sep.

Distribution: INDONESIA. Sulawesi, central part (1 specimen seen).

Notes: *Bulbophyllum ankyledon* differs from *B. pubiflorum* by having the flowers in 4 (not 5) rows around the rhachis, and the papillose (not glabrous) lip with a distinct thickening on the abaxial surface.

Bulbophyllum condylochilum J.J. Verm. & P. O'Byrne, *sp. nov.*

A *Bulbophyllis* *fraternalis* et *B. illecebrum* *labello distaliter abrupte conspicueque inflato differt.* – **Typus:** Indonesia, Sulawesi, central part, LEI 20050892 (holo, L). **Fig. 2.**

Roots mainly below the pseudobulbs. **Rhizome** creeping, 2.5–3 mm diam., sections between pseudobulbs 0.8–1.2 cm long, bracts barely persistent. **Pseudobulbs** loosely clustering, 1.4–2.3 x ca 0.9 cm, round in section. Petiole 0.7–1.2 cm long. **Leaf** blade elliptic, 4.2–5.9 x 1.3–1.8 cm, index (length/width) 3.2–3.3; acute. **Inflorescence** a rather dense raceme, ca 14 cm long, ca 18-flowered. Peduncle erect to patent, ca 10 cm, bracts ca 4, the longest ca 8 mm long. Rhachis nodding at the base, pendulous, not thickened, ca 3.6 cm long. Floral bracts approx. triangular, 2.5–3 x ca 2.5 mm, acute. **Flowers** not resupinate, not fully opening, many open simultaneously. Pedicel and ovary 2.2–2.5 mm long, basal node approx. flush with the surface of the rhachis. Median **sepal** somewhat recurved, approx. elliptic, ca 5.5 x 3.5 mm, index 1.5–1.6; top cucullate, rounded, margins entire, very finely papillose, base narrowly attached, almost unguiculate; rather thin, 3-veined, surface glabrous. Lateral sepals adnate along the lower margins, recurved, top part slightly incurved, oblique, ovate-triangular, ca 5.2 x 2.1 mm, index 2.4–2.5, top flat, acute, base broadly attached; thin but with a callus distally, near the lower margin, otherwise as the median sepal. **Petals** somewhat recurved, narrowly triangular, ca 4 x 1 mm, index ca 4; acute, margins entire, the lower somewhat erose near the base, base narrowly attached, almost unguiculate; thin, 1-veined, glabrous. **Lip** almost straight, general outline subspathulate with a slightly widened base, ca 4.5 x 1.9 mm, index 2.3–2.4, rounded, margins entire; proximally thick and distally very thick, rather thick in between, surface glabrous but distally papillose towards the margins on both sides; adaxially concave near the base, with a transverse wall connecting the sides just above the ligament, top part proximally abruptly thickened, with the margins abruptly turned upwards into rounded auricles, and convex; abaxially without a ridge near the base, top part convex and with a rounded median callus. Column ca 1.3 mm long, stigma without a tooth at its base, column foot with two obtuse, patent lateral teeth near its base, connected by a thick transverse ridge. Stelidia minute, abruptly bent downwards but with an antrorse, approx. acute tip, along the upper margin with a very large (far more conspicuous than the stelidia themselves), antrorse, somewhat obliquely ovate

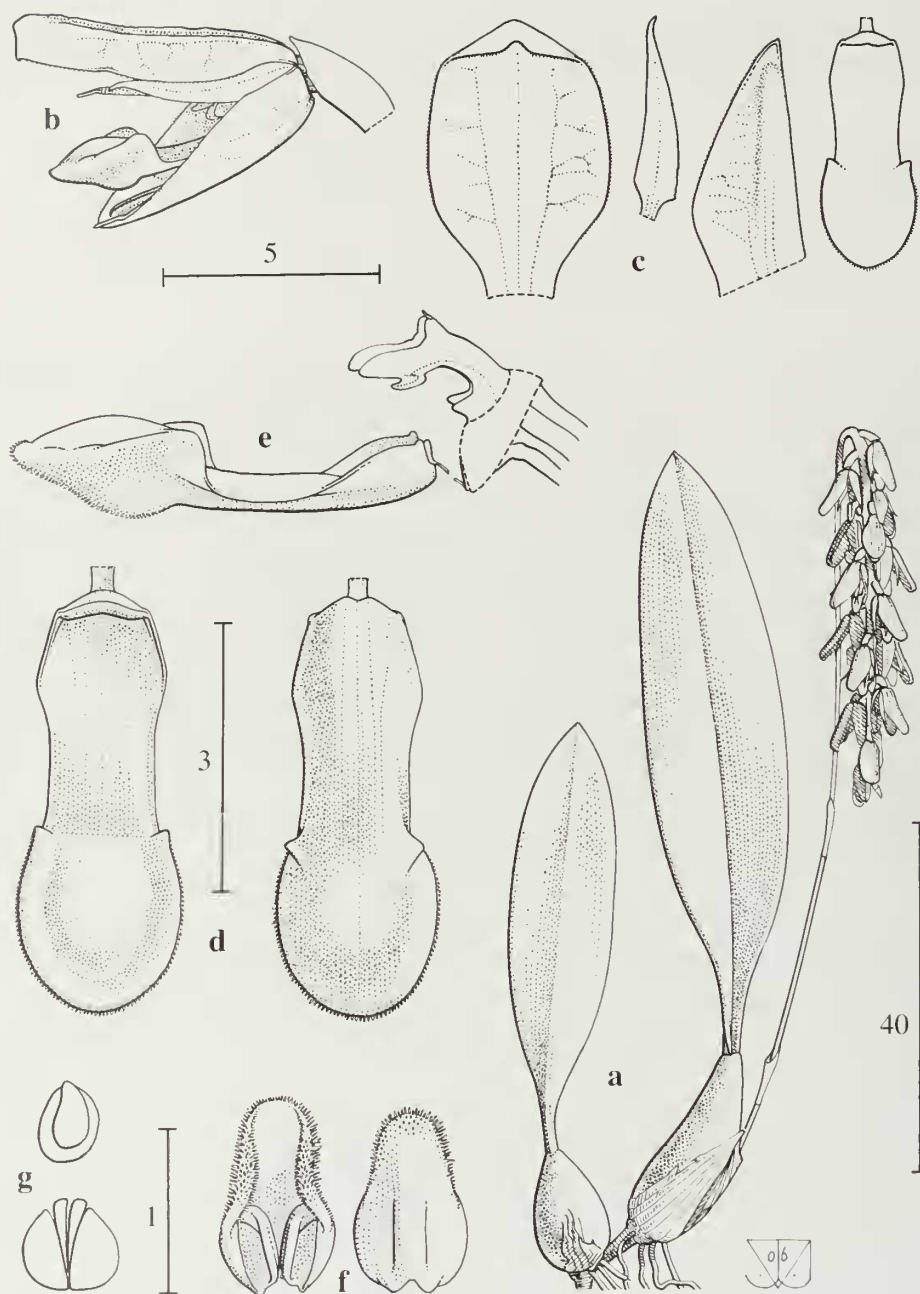


Figure 2. *Bulbophyllum condylochilum* J.J. Verm. & P. O'Byrne. A. Habit; B. Flower; C. Flower analysis, from left to right: median sepal, petal, lateral sepals, lip; D. Lip, left: adaxial side, right: abaxial side; E. Column and lip, lateral view; F. Anther, left: adaxial side, right: abaxial side; G. Pollinia, above: two pairs, below: a single pair. All from SBG-O 5827 (spirit sample).

wing with an obtuse top margin. Anther abaxially with a crest near its base, surface approx. glabrous towards the base, papillose towards the tip, front margin drawn out into a long, concave, rounded, papillose beak. **Pollinia** 4, the inner much flattened and slightly shorter than the outer, ellipsoid; no appendages present.

Colours: Sepals whitish near the base, with thick, blackish purple lines over the veins, entirely blackish purple near the top. Petals whitish near the base, increasingly stained blackish purple towards the top. Lip whitish, margins stained with blackish purple.

Habitat & ecology: Epiphyte in montane forest on steep slopes. Alt. 1200–1400 m. Flowering Jun, Aug, Sep.

Distribution: INDONESIA. Sulawesi, central part (1 specimen seen).

Notes: *B. condylochilum* differs from *B. fraternum* and *B. illecebrum* J.J. Verm. & P. O'Byrne in the distally abruptly and conspicuously swollen lip. The leaves are also distinctly wider.

Bulbophyllum fraternum J.J. Verm. & P. O'Byrne, *sp. nov.*

A Bulbophyllo illecebrum sepalo mediano glabro, petalis ligulatis abrupte coartantibus prope apicem papillosis differt. – **Typus:** Indonesia, Sulawesi, central part, SBG-O 5827 (holo, SING). **Fig. 3.**

Roots mainly below the pseudobulbs. **Rhizome** creeping, 2–2.5 mm diam., sections between pseudobulbs 0.6–1.5 cm long, bracts barely persistent. **Pseudobulbs** slightly distant, ovoid, 2–2.3 x 1.2–1.5 cm, only slightly and obtusely angular. Petiole 0.8–1.2 cm long. **Leaf** blade elliptic, 12–13 x 0.8–0.9 cm, index (length/width) 13–17; acute. **Inflorescence** a rather dense raceme, 5.5–11 cm long, 9–12-flowered. Peduncle erect to patent, 2.5–5.5 cm, bracts ca 3, the longest 5.5–8.5 mm long. Rhachis nodding at the base, pendulous, not thickened, 3–5.5 cm long. Floral bracts approx. triangular, ca 3.3 x 3 mm, acute. **Flowers** not resupinate, not fully opening, many open simultaneously. Pedicel and ovary ca 2.5 mm long, basal node approx. flush with the surface of the rhachis. Median **sepal** somewhat recurved, approx. elliptic, ca 6 x 3.5 mm, index ca 1.7; top cucullate, rounded, margins entire, approx. glabrous, base rather narrowly attached; rather thin, 3-veined, surface glabrous. Lateral sepals adnate along the lower margins, recurved, top part slightly incurved, oblique, ovate-triangular, ca 6.2 x 1.8 mm, index 3.4–3.5, top flat, subacute, base broadly attached; thin but with a slight callus distally, near the lower

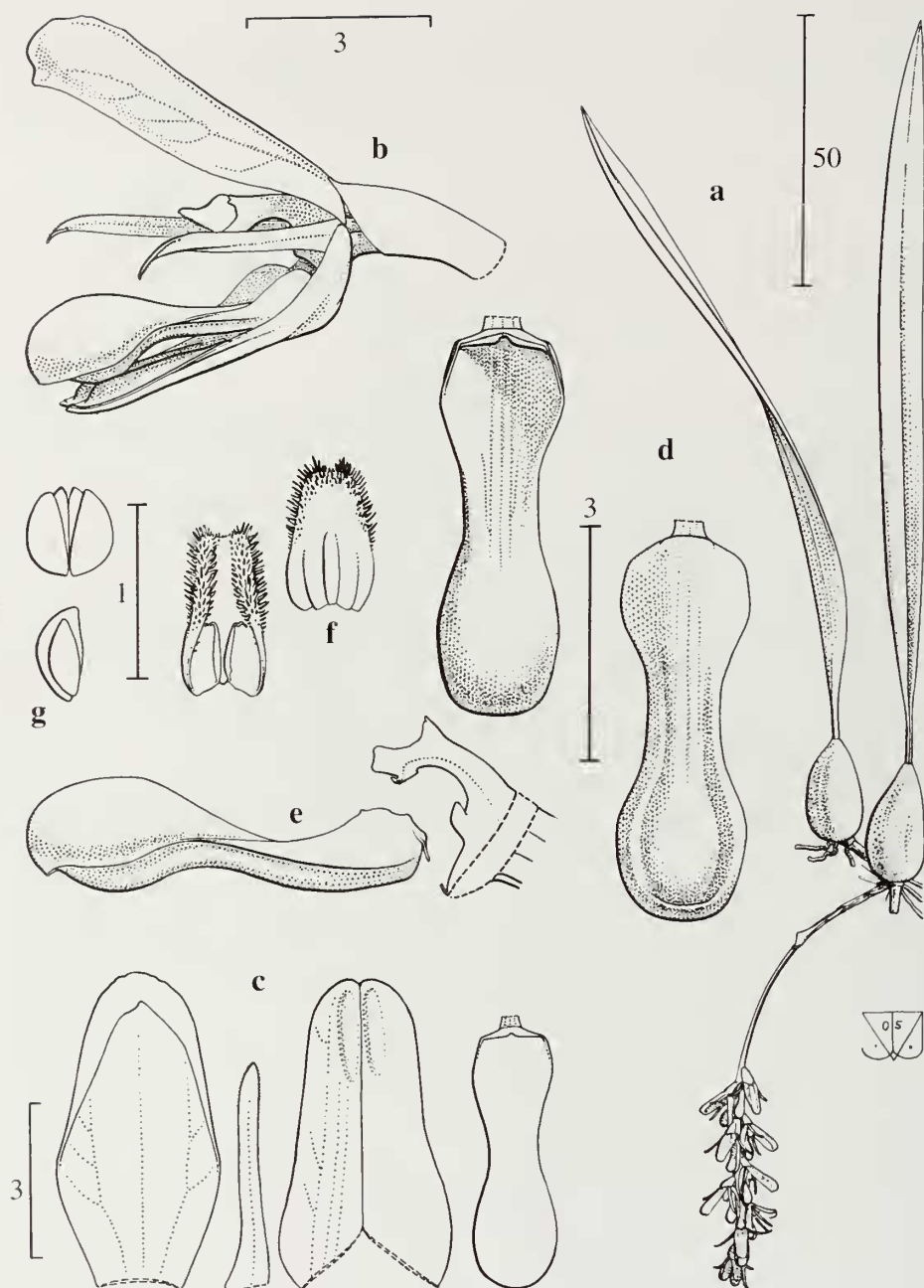


Figure 3. *Bulbophyllum fraternum* J.J. Verm. & P. O'Byrne. A. Habit; B. Flower; C. Flower analysis, from left to right: median sepal, petal, lateral sepals, lip; D. Lip, left: adaxial side, right: abaxial side; E. Column and lip, lateral view; F. Anther, left: adaxial side, right: abaxial side; G. Pollinia, above: two pairs, below: a single pair. All from SBG-O 5828 (spirit sample).

margin, otherwise as the median sepal. **Petals** recurved to spreading, linear with a slightly wider base, ca 4.4 x 0.9 mm, index 4.8-4.9; subacute, margins entire, finely papillose distally, base broadly attached; thin, 1-veined, glabrous but somewhat papillose distally. **Lip** almost straight, general outline subspathulate with a widened base, ca 5 x 1.7 mm, index 2.9-3, rounded, margins entire; proximally rather thick, distally very thick, glabrous; adaxially concave near the base, with a transverse wall connecting the sides just above the ligament, top part distinctly convex; abaxially without a ridge near the base, top part slightly concave but with a rounded median callus. Column ca 2 mm long, stigma without a tooth at its base, column foot with two obtuse, patent or slightly retrorse wings near its base. Stelidia minute, abruptly bent downwards but with an antrorse, approx. acute tip, along the upper margin with a very large (far more conspicuous than the stelidia themselves), antrorse, approx. rectangular wing with a truncate, slightly erose top margin. Anther abaxially with a crest near its base, surface approx. glabrous towards the base, papillose-ciliate towards the tip, front margin drawn out into a distinct, concave, triangular, obtuse, papillose beak. **Pollinia** 4, the inner much flattened and slightly shorter than the outer, ellipsoid; no appendages present.

Colours: Median sepal and petals translucent white with thick purplish red veins. Lateral sepals very pale greenish, with purplish red veins and some staining in the same colour. Lip pale orange, top part suffused with some purplish red. Column white, stained pinkish purple.

Habitat & ecology: Epiphyte in montane forest on steep slopes. Alt. 1100–1200 m. Flowering Feb-May, Aug, Nov.

Distribution: INDONESIA. Sulawesi, central part (1 specimen seen).

Notes: *B. fraternum* differs from *B. illecebrum* in the shape of the petals, being strap-shaped over most of their length, abruptly narrowing and papillose at the tip. In *B. illecebrum* they are gradually tapering towards the tip and entirely glabrous. *B. fraternum* also differs in having a glabrous median sepal. Vegetatively, the plant resembles *B. centrosemiflorum* J.J. Sm. (sect. *Hyalosema*), from New Guinea, with its swollen, ovoid pseudobulbs and very narrow leaves.

Bulbophyllum kiamfeeanum J.J. Verm. & P. O'Byrne, *sp. nov.*

A *Bulbophyllo* pubifloro *sepalis* abaxialiter *glabris*, *labello* ovato *differt.*

– **Typus:** Indonesia, Sulawesi, central part, SBG-O 4806 (holo, SING).

Fig. 4.

Roots spreading. **Rhizome** creeping or shortly erect in mature plants, 2-3 mm diam., sections between pseudobulbs 1.2-1.8 cm long, bracts not persistent. **Pseudobulbs** loosely clustering, ovoid, 2.5-3 x 1-1.2 cm, without distinct angles. Petiole 0.2-0.3 cm long. **Leaf** blade elliptic, 10-13 x 1.8-2.2 cm, index (length/width) 5.8-5.9; acute. **Inflorescence** patent, a rather dense raceme, ca 9.2 cm long, 18-flowered. Peduncle ca 4.7 cm, bracts ca 3, the longest ca 4 mm long. Rhachis somewhat nodding, slightly thickened, cylindrical, ca 4.5 cm long, ca 3 mm across. Floral bracts ca 1.6 mm, acute. **Flowers** not resupinate, spirally arranged in 4 rows, not fully opening, many open simultaneously. Pedicel and ovary ca 2 mm long, basal node approx. flush with the surface of the rhachis. Median **sepal** approx. recurved, ovate, ca 4.2 x 2.9 mm, index 1.4-1.5; top cucullate, rounded, margins entire, papillose-ciliolate, base rather broadly attached; rather thin, 3-veined, surface glabrous. Lateral sepals adnate along the lower margins, basal part recurved, top part incurved, oblique, triangular, ca 4.2 x 2 mm, index ca 2.1, top flat, obtuse, base broadly attached; 3-veined, otherwise as the median sepal. **Petals** recurved, triangular, ca 3.6 x 0.9 mm, index ca 4; acute, margins entire, papillose-ciliolate, base broadly attached; thin, 1-veined, surface glabrous. **Lip** straight, general outline ovate, ca 3.2 x 1.5 mm, index ca 2.1 (all without artificial spreading); rounded, margins entire, finely papillose; rather thick, surface glabrous; adaxially slightly concave near the base, convex towards the tip, abaxially without a ridge near the base. Column ca 1.8 mm long, stigma without a tooth at its base, column foot with 2 slight, rounded swellings along the margin near its base, deeply sunk in between the basal part of the lateral sepals without even the tip protruding. Stelidia minute, abruptly bent downwards but with an antrorse, obtuse tip, along the upper margin with a very large (far more conspicuous than the stelidia themselves), antrorse, rhombic wing with a truncate, slightly erose top margin. Anther abaxially with a crest near the base, surface approx. glabrous, front margin drawn out into a triangular, rounded beak, margin coarsely papillose. **Pollinia** 4, the inner much flattened and about as long as the outer, all ellipsoid-ovoid; no appendages present.

Colour: Pseudobulbs olive green, petiole suffused with some red, leaf blade dark green. Peduncle and rhachis densely mottled purplish red. Sepals yellowish, somewhat pale green towards the tip, the median with the veins and the margins purplish red especially in the proximal half, the laterals over their entire length. Petals translucent white with a purplish red midvein and margins. Lip yellow, with some red markings near the base. Column white, stelidia pale green.

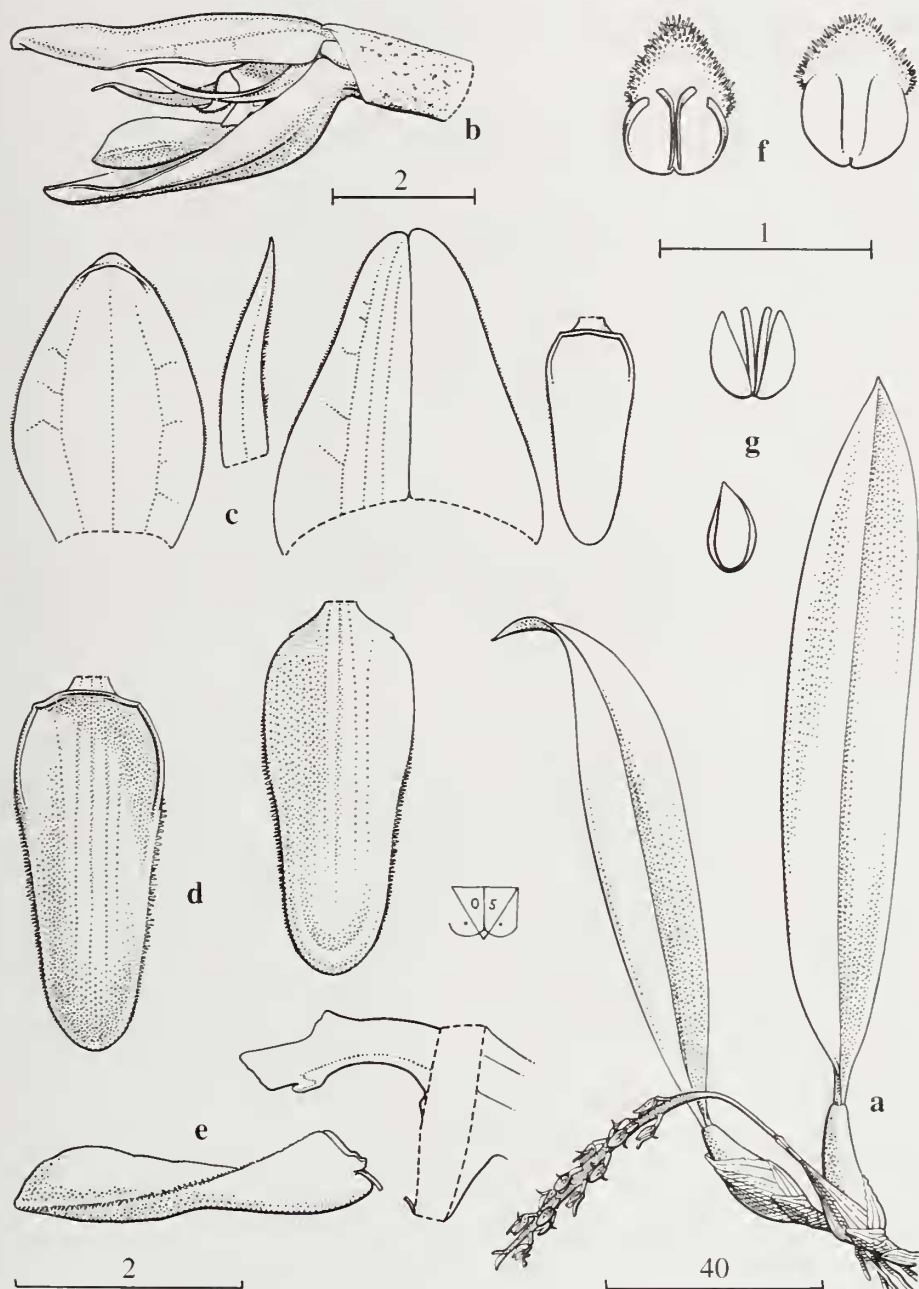


Figure 4. *Bulbophyllum kiamfeeanum* J.J. Verm. & P. O'Byrne. A. Habit; B. Flower; C. Flower analysis, from left to right: median sepal, petal, lateral sepals, lip; D. Lip, left: adaxial side, right: abaxial side; E. Column and lip, lateral view; F. Anther, left: adaxial side, right: abaxial side; G. Pollinia, above: two pairs, below: a single pair. All from SBG-O 4806 (spirit sample).

Habitat & ecology: Epiphyte in mossy montane forest. Alt. ca 1450 m. Flowering Oct.

Distribution: INDONESIA. Sulawesi, central part (1 specimen seen).

Notes: *Bulbophyllum kiamfeeum* is most similar to *B. pubiflorum* but differs by the sepals, which are glabrous abaxially. The lip is ovate in general outline (not hastate). Vegetatively it differs from other Sulawesi species of the section with a generally creeping rhizome and similar flowers (*B. ankyledon* J.J. Verm., *B. pubiflorum* Schltr., *B. trigonobulbum* J.J. Sm.) by having a much shorter rhizome with loosely clustered pseudobulbs.

Named after Mr. Kiam Fee (Paul) Leong at the Herbarium of Singapore Botanic Gardens.

Bulbophyllum molle J.J. Verm. & P. O'Byrne, *sp. nov.*

A Bulbophyllo osyriceroidi pedunculo rhachide circa aequilonga, rhachide circa 4 mm crassa, petalis truncatis, labello parte apicali recta differt.

– **Typus:** Indonesia, Sulawesi, central part, *SBG-O 5286* (holo, SING).

Fig. 5.

Roots spreading. **Rhizome** creeping, 3.5–7 mm diam., sections between pseudobulbs 0.9–1.8 cm long, bracts not persistent. **Pseudobulbs** distant, minute, ovoid to ellipsoid, 0.4–0.8 x 0.4–0.8 cm, rounded. Petiole 2.5–6.5 cm long. **Leaf** blade elliptic to obovate, 9.5–21 x 1.9–3 cm, index (length/width) 5–7; obtuse. **Inflorescence** erect to patent, a lax raceme, 18–28 cm long, 15–38-flowered. Peduncle 10–15 cm, bracts 3, the longest 6–16 mm long. Rhachis thickened, cylindrical, 8–13 cm long, ca 4 mm across. Floral bracts 3.5–4 mm, acute. **Flowers** not resupinate, spirally arranged, not fully opening, several open simultaneously. Pedicel and ovary ca 1.3 mm long, basal node approx. flush with the surface of the rhachis. Median **sepal** somewhat recurved, ovate, ca 8.2 x 2 mm, index ca 4.1; subacute, margins slightly and finely erose distally, base broadly attached; rather thin but rather thick distally and along the midvein, 3-veined, surface glabrous. Lateral sepals adnate along the lower margins, approx. porrect, oblique, ca 8 x 3.2 mm, index ca 2.5, acute, margins entire, base rather broadly attached; rather thin, 3–4-veined, otherwise as the median sepal. Petals recurved, obovate-spathulate, ca 2.2 x 1.8 mm, index ca 1.2; truncate-rounded, margins finely erose, base narrowly attached; rather thin but thick proximally, 1-veined, surface approx. glabrous. **Lip** slightly curved about half-way, top part straight, general elliptic-ovate, ca 5.2 x 2 mm, index ca 2.6 (all without artificial spreading), rounded, margins entire, surface finely papillose distally; thick; adaxially slightly concave near



Figure 5. *Bulbophyllum molle* J.J. Verm. & P. O'Byrne. A. Habit; B. Flower; C. Flower analysis, from left to right: median sepal, petal, lateral sepals, lip; D. Lip, left: adaxial side, right: abaxial side; E. Column and lip, lateral view; F. Anther, left: adaxial side, right: abaxial side; G. Pollinia, above: two pairs, below: a single pair. All from SBG-O 5286 (spirit sample).

the base, without a median slit, transition to the top part a sharp, narrowly v-shaped fold with the legs starting at the margin at about $\frac{1}{3}$ of the length of the lip, converging and meeting at about $\frac{1}{2}$ of the length of the lip, top part convex; abaxially with a truncate ridge up to about $\frac{1}{3}$ of the length of the lip, median part slightly concave, top part slightly convex because of two flat longitudinal calli meeting over the midvein. Column ca 2 mm long, stigma without a tooth at its base, column foot without teeth. Stelidia 0.9 mm long, truncate and shallowly 3-toothed, with an antrorse, long, slender, triangular, acute tooth along the upper and the lower margin. Anther abaxially with a crest near the base, surface somewhat papillose, front margin drawn out into a rounded beak with a coarsely and irregularly papillose margin. **Pollinia** 4, the inner much flattened and about half as long as the outer, all ellipsoid-ovoid; no appendages present.

Colour: Rhachis pale green. Sepals very pale greenish with dark purplish red veins and some stains in the same colour. Petals translucent white, midvein purplish red, margins almost black. Lip yellowish green, stained purplish red, and blackish purple towards the base. Column very pale greenish.

Habitat & ecology: Epiphyte in mossy montane forest. Alt. ca 1000 m. Flowering Jul.

Distribution: INDONESIA. Sulawesi, central part (1 specimen seen).

Notes: *B. molle* is similar to *B. osyriceroides* J.J. Sm., from Sumatra. It differs in having a peduncle about as long as the rhachis (peduncle much shorter than the rhachis in *B. osyriceroides*), a rhachis of approx. 4 mm thick (2 mm in *B. osyriceroides*), truncate petals (rounded with an apiculate tip in *B. osyriceroides*), and a lip without a median slit and with a straight top part (with median slit and with a slightly recurved top part in *B. osyriceroides*).

Bulbophyllum sect. *Epicranthes* (Bl.) Hook.f.

Epicranthes Bl., Bijdr. Fl. Ned. Ind. (1825) 307. – *Bulbophyllum* sect. “*Epicrianthes*” (Bl.) Hook. F., Fl. Brit. India 5 (1890) 753; *Bulbophyllum* subg. “*Epicrianthes*” (Bl.) Schltr., Feddes Repert. Beih. 1 (1913) 705. – TYPE SPECIES: *Epicranthes javanica* Bl. [*Bulbophyllum epicrianthes* (Bl.) Hook.f.].

Assuming that the name *Epicranthes* is derived from the Greek ‘epikron’,

sailyard, which is likely to refer to the vegetative shape of the type species and many others (a hanging rhizome with patent leaves in two rows), there is no reason to accept the later modification into '*Epicrianthes*'.

Most species of section *Epicranthes* are rare plants, and appear to occur very locally. They are known from a single or a few collections only. Next to this, the distinguishing characters of many species would be considered of minor importance in other sections of the genus. *B. spodotriche* and *B. xanthomelanon*, described below, certainly fall within this category. For the time being, we continue to apply a narrow species concept in this section, because so far it appears the most accurate description of morphological patterns that we observe in this section.

Bulbophyllum brachytriche J.J. Verm. & P. O'Byrne, *sp. nov.*

A Bulbophyllo vesiculoso sepalis angustioribus, labello rotundato, vesiculis multo minoribus differt. – **Typus:** Indonesia, Sulawesi, central part, SBG-O 5052 (holo, SING). **Fig. 6.**

Roots most produced close to the base of the rhizome. **Rhizome** hanging, ca 13 cm long, 1.2–2 mm diam., sections between pseudobulbs 1.5–2.5 cm long, bracts persistent. **Pseudobulbs** well spaced, ovoid to almost cylindrical, 1–1.5 x 0.25–0.4 cm. Petiole 0.2–0.3 cm long. **Leaf** blade ovate, 4.5–6 x 1.5–2.4 cm, index (length/width) 2.3–3; acute to acuminate. **Inflorescence** ca 1.5 cm long, 1-flowered. Peduncle porrect, 0.4–0.5 cm, bracts 3, the longest ca 4 mm long. Floral bracts tubular at the base, ca 3.5 mm, acute. **Flowers** opening wide. Pedicel and ovary ca 7.5 mm long, basal node on a ca 2.5 mm-long stump. Median **sepal** spreading, ovate, ca 9.5 x 2.5 mm, index ca 3.8; acute, margins entire, base broadly attached; thick, glabrous. Lateral sepals ca 9.5 x 2.7 mm, index ca 3.5; otherwise as the median sepal. **Petals** porrect, approx. lyriform, ca 1 x 1.5 mm excluding appendages, index 0.6–0.7; margins with 7 appendages more or less regularly spaced along the front margin, base broadly attached; thin, glabrous; appendages ovate, 1–1.3 x 0.2–0.25 mm, gradually narrowing into a stalk of 0.5–0.8 mm, obtuse, fleshy, finely papillose. **Lip** slightly recurved near the base, elliptic-ovate but constricted half-way, ca 2 x 1 mm, index ca 2 (all without artificial spreading); rounded, margins entire; thick; adaxially deeply concave proximally and with two distinct, rounded ridges starting at the base and running parallel, close together up to $\frac{2}{3}$ of the length of the lip, slightly over half way along the lip they are clasped between the margins which converge over the adaxial surface of the lip and almost meet the ridges, surface convex distally, glabrous; abaxially with a wide, retuse ridge up to about half-way along the lip, surface coarsely papillose to vesiculate distally along the sides, leaving a glabrous strip in the middle.

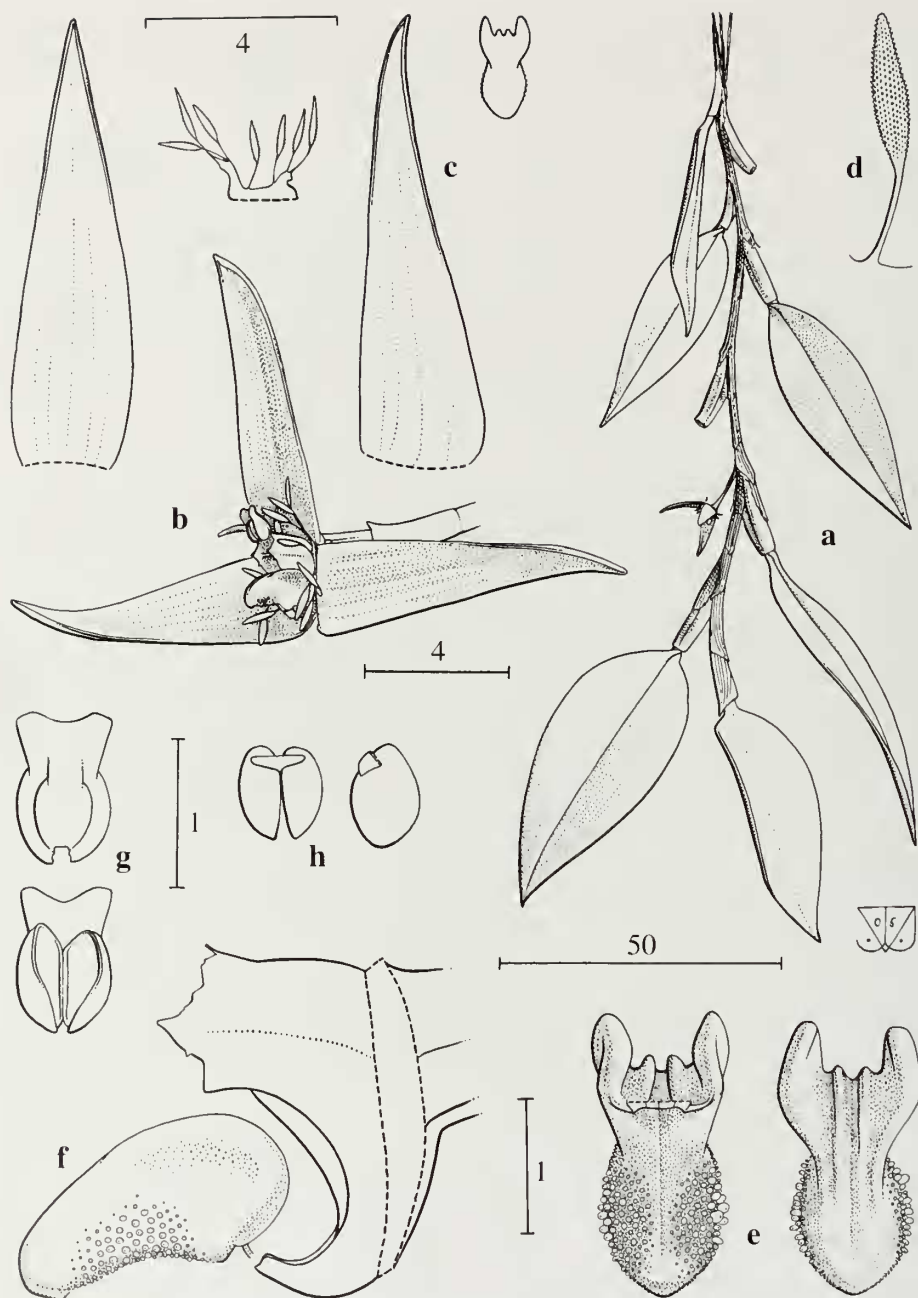


Figure 6. *Bulbophyllum brachytriche* J.J. Verm. & P. O'Byrne. A. Habit; B. Flower; C. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; D. Appendage of petal; E. Lip, left: abaxial side, right: adaxial side; F. Column and lip, lateral view; G. Anther, above: abaxial side, below: adaxial side; H. Pollinia, left: two pairs, right: a single pair. All from SBG-O 5052 (spirit sample).

Column ca 1.7 mm long, stigma triangular, without a tooth at its base, column foot without teeth near the tip. Stelidia porrect, triangular, ca 0.5 mm long, acute, with an erose upper margin, with a distinct, deltoid, subacute tooth along the lower margin, and a minute tooth in front of this. Anther abaxially with a distinct, papillose crest, surface otherwise finely papillose, front margin drawn out into a retuse beak with approx. entire margins. **Pollinia** 2, ellipsoid, with a short, fleshy appendage.

Colour: Leaves suffused with purple. Sepals pale creamy yellow with numerous red dots. Petals creamy white, appendages greyish green. Lip white, dark red at the tip.

Habitat & ecology: Epiphyte in montane forest, on branches of medium-sized trees. Ait. ca 1200-1400 m. Flowering Feb-May, Jul.

Distribution: INDONESIA. Sulawesi, central part (1 specimen seen).

Notes: *Bulbophyllum vesiculosum* J.J. Sm. also has petal appendages of about 1 mm long. It differs from *B. brachytriche* in having an acute lip with much larger vesicles, and in having wider sepals (index 1.4-2). Sterile specimens can be recognized by the pale purplish leaves, which are thinner than usual in this section.

Bulbophyllum spodotriche J.J. Verm. & P. O'Byrne, *sp. nov.*

A *Bulbophyllis* chlororhopalon *et* *B. decatriche* *ac* *B. psilorhopalon appendicibus in petalis in fasciculis duobus ordinatis, inter fasciculos sine appendice minuta differt.* – **Typus:** Indonesia, Sulawesi, central part, SBG-O 4931 (holo, SING). **Fig. 7.**

Roots most produced close to the base of the rhizome. **Rhizome** hanging, ca 14 cm long, 2-2.5 mm diam., sections between pseudobulbs 1.2-2 cm long, bracts persistent. **Pseudobulbs** well spaced, ovoid to ellipsoid, 0.8-1.8 x 0.4-0.7 cm. **Leaf** blade subsessile, elliptic, 4.5-5.8 x 1.3-2.5 cm. index (length/width) 2.3-3.5; obtuse to acute. **Inflorescence** ca 2 cm long, 1-flowered. Peduncle porrect, ca 0.8 cm, bracts 3, the longest ca 4 mm long. Floral bracts tubular at the base, ca 4 mm, acute. **Flowers** opening wide. Pedicel and ovary ca 8.5 mm long, basal node on a ca 3.5 mm-long stump. Median **sepal** spreading, elliptic-ovate, ca 10 x 4.5 mm, index 2.2-2.3; acute, margins entire, base broadly attached; thick, glabrous. Lateral sepals as the median sepal. **Petals** porrect, approx. lyriform, ca 1 x 3 mm excluding appendages, index 0.3-0.4; margins with 11 appendages arranged in two dense clusters

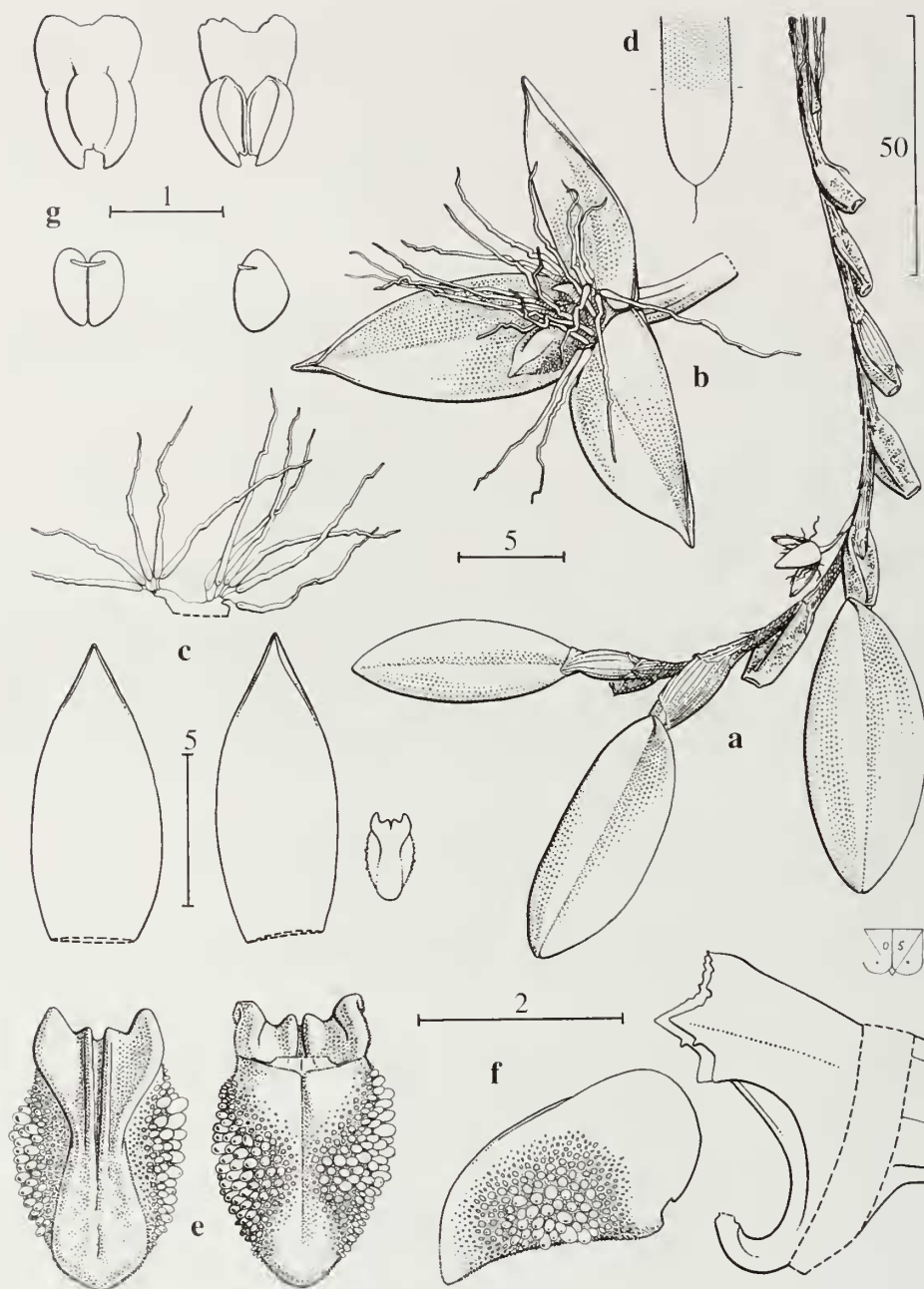


Figure 7. *Bulbophyllum spodotriche* J.J. Verm. & P. O'Byrne. A. Habit; B. Flower; C. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; D. Appendage of petal; E. Lip, left: adaxial side, right: abaxial side; F. Column and lip, lateral view; G. Anther, left: abaxial side, right: adaxial side; H. Pollinia, left: a pair, right: a single. All from SBG-O 4931 (spirit sample).

each at one end of the front margin, base broadly attached; thin, glabrous; appendages ovate-triangular, 5-8.5 x 0.3-0.4 mm, abruptly narrowing into a stalk of 0.4-0.7 mm, gradually narrowing towards an acute tip, fleshy but flat, very finely papillose. **Lip** hardly recurved, elliptic-ovate, ca 3 x 1.8 mm, index 1.6-1.7 (all without artificial spreading); rounded, margins entire; thick; adaxially deeply concave proximally and with two distinct, rounded ridges starting at the base and running parallel, close together over most of the length of the lip, about half way along the lip they are clasped between the margins which converge over the adaxial surface of the lip, almost meet the ridges and then spread out again, adaxial surface convex distally, glabrous; abaxially with a wide, retuse ridge up to about half-way along the lip, surface coarsely vesiculate along the sides, leaving a narrow glabrous strip in the middle. Column ca 2.1 mm long, stigma obovate, without a tooth at its base, column foot without teeth near the tip. Stelidia porrect, triangular, ca 0.6 mm long, acute, with a denticulate upper margin, with a distinct, deltoid, subacute tooth which has the front margin folded inwards along the lower margin, and a minute tooth in front of this. Anther abaxially with a distinct crest, surface approx. glabrous, front margin drawn out into a retuse beak with erose margins. **Pollinia** 2, ellipsoid, with a short, fleshy appendage.

Colour: Leaves dark green, slightly suffused with purple. Sepals yellowish, densely spotted and suffused with ochrish red. Petals yellow, appendages ash-grey near the base, white towards the tip. Lip white near the base, dark red towards the tip. Column yellow, spotted pale red.

Habitat & ecology: Epiphyte in montane forest. Alt. ca 1000 m. Flowering Feb, Mar, Jul-Sep, Dec.

Distribution: INDONESIA. Sulawesi, central part (1 specimen seen).

Notes: Similar to *B. chlororhopalon* Schltr., *B. decatricha* J.J. Verm., and *B. psilorhopalon* Schltr., but different in having the appendages on the petals arranged in two clusters; the species mentioned have the appendages either more or less regularly spaced along the front margin of the petal, or at least 1 appendage in between the clusters.

Bulbophyllum stenomeris J.J. Verm. & P. O'Byrne, *sp. nov.*

A *Bulbophyllo* epicrianthes *labello loriformi apice obtuso petalorum appendicibus brevior differt.* – **Typus:** Indonesia, Sulawesi, central part, SBG-O 5220 (holo, SING). **Fig. 8.**

Roots most produced close to the base of the rhizome. **Rhizome** hanging, ca 20 cm long, ca 3 mm diam., sections between pseudobulbs 1.5-2.5 cm long, bracts persistent. **Pseudobulbs** well spaced, ovoid, 1-1.4 x 0.6-0.9 cm. Petiole 0.1-0.3 cm long. **Leaf** blade elliptic, 3-4 x 1.8-2.3 cm, index (length/width) 1.6-1.8; obtuse. **Inflorescence** ca 1.5 cm long, 1-flowered. Peduncle porrect, ca 0.3 cm, bracts (not seen). Floral bracts tubular at the base, ca 3.6 mm, acute. **Flowers** opening wide. Pedicel and ovary ca 7 mm long, basal node on a ca 3.2 mm-long stump. Median **sepal** spreading, ovate, ca 9 x 3 mm, index ca 3; acute, margins entire, base broadly attached; thick, glabrous. Lateral sepals as the median sepal. **Petals** porrect, approx. lyriform, ca 1 x 2 mm excluding appendages, index ca 0.5; with 5 appendages more or less regularly spaced along the front margin, base broadly attached; thin, glabrous; appendages linear, 3.5-5 x 0.3-0.5 mm, abruptly narrowing into a stalk of 0.5-1 mm, slightly narrowing towards an obtuse tip, fleshy, very finely papillose-hirsute. **Lip** hardly recurved, ovate, ca 5 x 0.9 mm, index 5.5-5.6 (all without artificial spreading); obtuse, margins entire; thick; adaxially deeply concave proximally and with two distinct, rounded ridges starting at the base, immediately converging and then running parallel, close together up to $\frac{1}{4}$ - $\frac{1}{3}$ of the length of the lip, half-way along their length they are clasped between the margins which converge over the adaxial surface of the lip and then fuse to them, surface convex distally, very finely papillose; abaxially with a wide, retuse ridge up to $\frac{1}{4}$ - $\frac{1}{3}$ of the length of the lip, surface glabrous but with a patch of coarse papillae towards the side at about $\frac{1}{4}$ of the length of the lip, leaving a glabrous strip in the middle. Column ca 2 mm long, stigma slitlike, without a tooth at its base, column foot without teeth near the tip. Stelidia porrect, deltoid, ca 0.4 mm long, acute, with a denticulate upper margin, with a distinct, deltoid, subacute tooth which has the front margin folded inwards along the lower margin, and a minute tooth in front of this. Anther abaxially with a distinct, papillose crest, surface approx. glabrous, front margin drawn out into a retuse, papillose beak with entire margins. **Pollinia** 4, all drop-shaped, the inner about half as long as the outer, without appendage.

Colour: Leaves medium green, not suffused with purple. Sepals pale yellow, with large, dark red spots near the base, smaller spots towards the tip and the margins. Petals pale yellow, appendages dull brownish red. Lip dark red. Column yellowish, stained with pale red.

Habitat & ecology: Epiphyte in remnant of dry, low forest on serpentinite soil. Alt. 100- 400 m. Flowering Feb, Mar.

Distribution: INDONESIA. Sulawesi, central part (1 specimen seen).

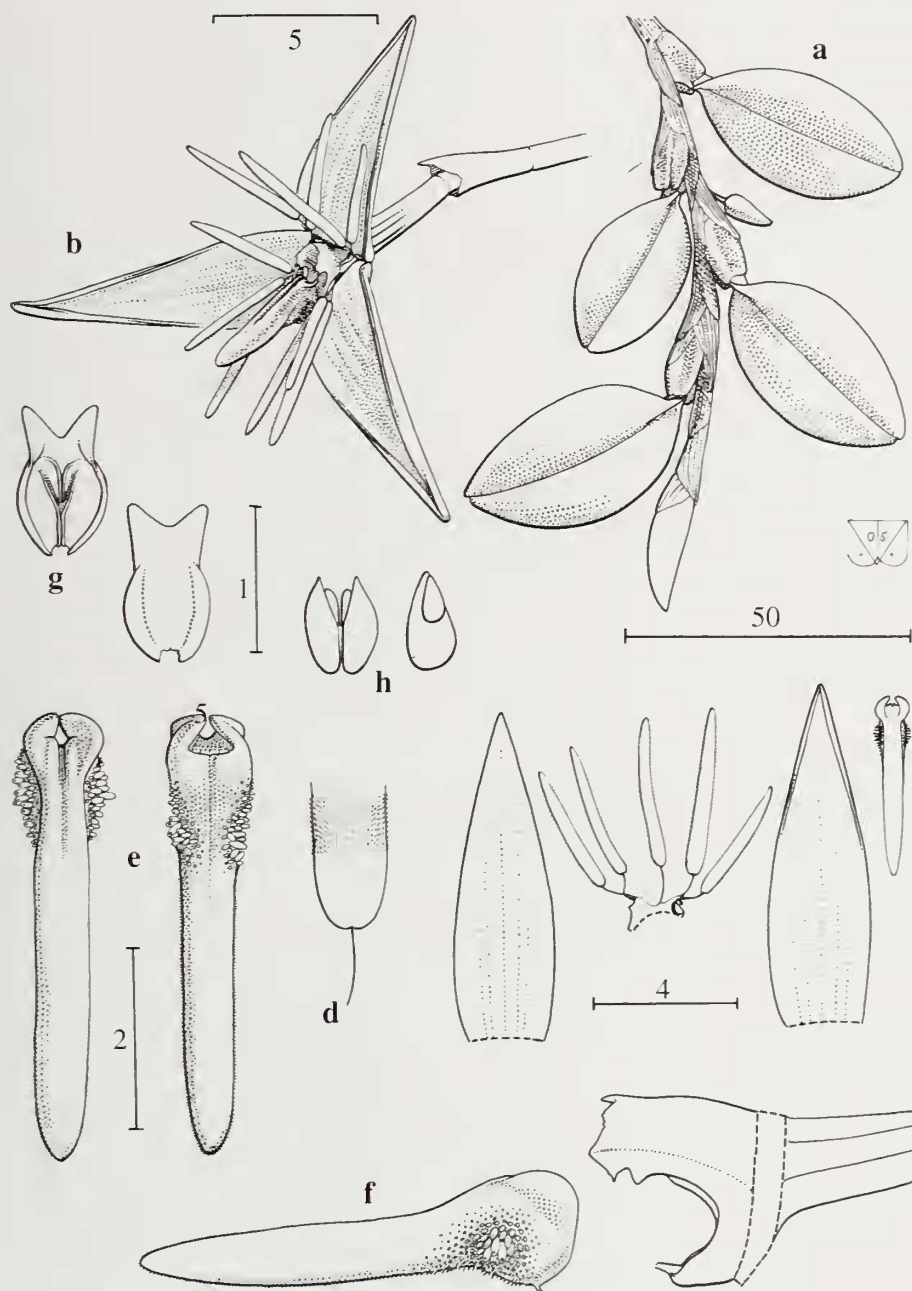


Figure 8. *Bulbophyllum stenomeris* J.J. Verm. & P. O'Byrne. A. Habit; B. Flower; C. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; D. Appendage of petal; E. Lip, left: adaxial side, right: abaxial side; F. Column and lip, lateral view; G. Anther, left: adaxial side, right: abaxial side; H. Pollinia, left: a pair, right: a single. All from SBG-O 5220 (spirit sample).

Notes: The only other species of sect. *Epicranthes* with a narrow, almost glabrous top part of the lip is *B. epicrianthes* Hook.f. In this species, however, the top part of the lip is ovate and acute, and the lip is relatively larger (about twice as long as the petal appendages).

Bulbophyllum xanthomelanon J.J. Verm. & P. O'Byrne, sp. nov.

A *Bulbophyllo flavofimbriato stelidiis elongatioribus ala deltoidea acuta inferne secus marginem inferiorem, antice dente minuto differt.* – **Typus:** Indonesia, Sulawesi, central part, *SBG-O 5810* (holo, SING). **Fig. 9.**

Roots most produced close to the base of the rhizome. **Rhizome** hanging, ca 35 cm long, 2.5–3 mm diam., sections between pseudobulbs 1–2.2 cm long, bracts persistent. **Pseudobulbs** well spaced, ellipsoid to obovoid, 1–1.5 x 0.5–0.8 cm. Petiole ca 0.1 cm long. **Leaf** blade elliptic to ovate, 4.3–5.6 x 2.2–2.7 cm, index (length/width) 1.8–2.3; acute. **Inflorescence** ca 2 cm long, 1-flowered. Peduncle porrect, 0.35–0.6 cm, bracts 3, the longest ca 5 mm long. Floral bracts tubular at the base, 3–3.8 mm, acute. **Flowers** opening wide. Pedicel and ovary 9–9.5 mm long, basal node on a 3–4 mm-long stump. Median **sepal** spreading, ovate, ca 8 x 4.5 mm, index 1.7–1.8; acuminate, margins entire, base broadly attached; thick, glabrous. Lateral sepals as the median sepal. **Petals** porrect, approx. lyriform, ca 1.5 x 2 mm excluding appendages, index 0.7–0.8; margins with 6 appendages more or less regularly spaced along the front margin, base broadly attached; thin, glabrous; appendages ovate, 1.3–3.8 x 0.3–0.35 mm, gradually narrowing into a stalk of 0.3–0.8 mm, obtuse, fleshy, finely papillose. **Lip** hardly recurved, ovate, ca 2.7 x 1.7 mm, index 1.5–1.6 (all without artificial spreading); subacute, margins entire; thick; adaxially slightly concave proximally and with two distinct, rounded ridges starting at the base, and running parallel, close together up to ca half way the length of the lip, there they are fused to the margins which converge over the adaxial surface of the lip and then run parallel over another $\frac{1}{3}$ of the length of the lip, surface convex distally, glabrous; abaxially with a wide, retuse ridge near the base, surface coarsely papillose or vesiculate except for a glabrous strip around the midvein. Column ca 2.5 mm long, stigma obovate, without a tooth at its base, column foot without teeth near the tip. Stelidia porrect, triangular, ca 0.6 mm long, subacute, with a denticulate upper margin, with a distinct, deltoid, subacute tooth along the lower margin, and a minute tooth in front of this. Anther abaxially with a distinct crest, surface approx. glabrous, front margin drawn out into a retuse beak with denticulate margins. Pollinia 4, all drop-shaped, the inner about half as long as the outer, without appendage.

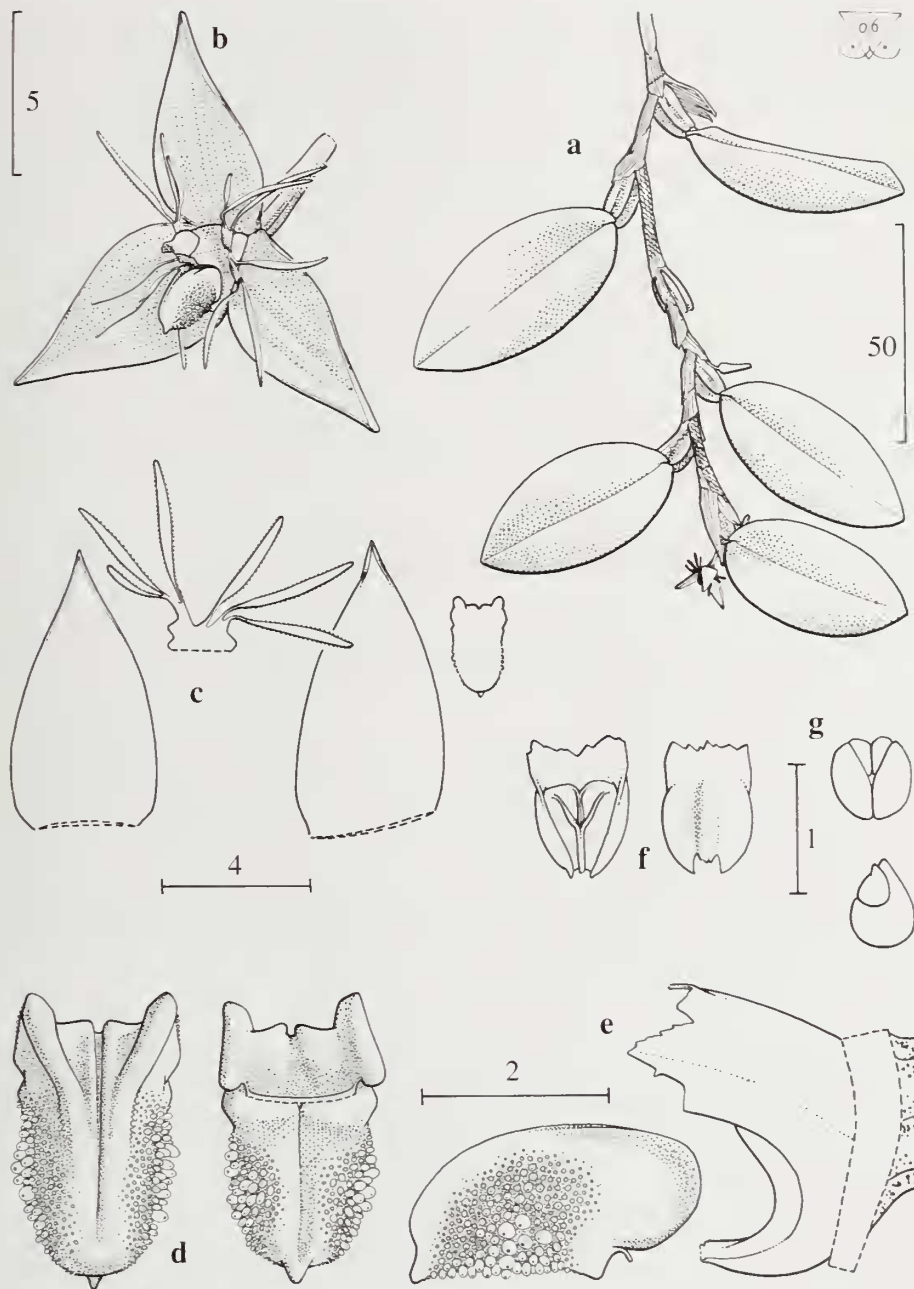


Figure 9. *Bulbophyllum xanthomelanon* J.J. Verm. & P. O'Byrne. A. Habit; B. Flower; C. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; D. Lip, left: adaxial side, right: abaxial side; E. Column and lip, lateral view; F. Anther, left: adaxial side, right: abaxial side; G. Pollinia, above: two pairs, below: a single pair. All from SBG-O 4902 (spirit sample).

Colour: Leaves green, suffused with some red. Sepals yellow. Petals whitish yellow, slightly suffused with pink; appendages blackish. Lip and tip column blackish red.

Habitat & ecology: Epiphyte in montane forest. Alt. ca 1200 m. Flowering all year round.

Distribution: INDONESIA. Sulawesi, central part (1 specimen seen).

Notes: *B. xanthomelanon* is most similar to *B. flavofimbriatum* J.J. Sm. It differs in having more elongated stelidia, with a deltoid, acute wing along the lower margin that is positioned further away from their tip. In front of this wing a second, minute tooth is present, lacking in *B. flavofimbriatum*.

***Bulbophyllum* sect. *Hybochilus* Schltr.**

Bulbophyllum sect. *Hybochilus* Schltr., Feddes Repert. 10 (1912) 96; Schltr., Feddes Repert. Beih. 1 (1913) 823. – TYPE SPECIES: *Bulbophyllum masarangicum* Schltr.

As Schlechter (1913) says, this section differs only from sect. *Monanthes* (= sect. *Polyblepharon*, see below) in having free, not fused, lateral sepals.

***Bulbophyllum acutilobum* J.J. Verm. & P. O'Byrne, sp. nov.**

A *Bulbophyllis* decurrentilobo *et* *B. depresso petalis rotundatis, labelli lobis lateralibus acutis differt.* – **Typus:** Indonesia, Sulawesi, central part, SBG-O 4912 (holo, SING). **Fig. 10.**

Roots below the pseudobulbs. **Rhizome** creeping, 0.8-1 mm diam., sections between pseudobulbs 0.3-0.5 cm long, bracts not persistent. **Pseudobulbs** spaced, ovoid, 0.3-0.5 x 0.3-0.4 cm. Petiole up to 0.1 cm long. **Leaf** blade elliptic to ovate, ca 1.8 x 0.5-0.6 cm, index (length/width) 3-3.6; acuminate. **Inflorescence** ca 1 cm long, 1-flowered. Peduncle patent, ca 0.45 cm, bracts ca 2, the longest ca 1.7 mm long. Floral bract tubular, ca 2 mm, acuminate. Flowers not fully opening. Pedicel and ovary ca 1.2 mm long, basal node coinciding with the bract attachment. Median **sepal** recurved, triangular, ca 4 x 1.5 mm, index 2.6-2.7; acute, margins entire, base broadly attached; rather thick, thickened towards the tip, glabrous. Lateral sepals free, oblique, ca 4 x 1.9 mm, index ca 2.1; otherwise as the median sepal. **Petals** porrect, elliptic-obovate, ca 1.3 x 0.5 mm, index ca 2.6; rounded, margins erose distally,

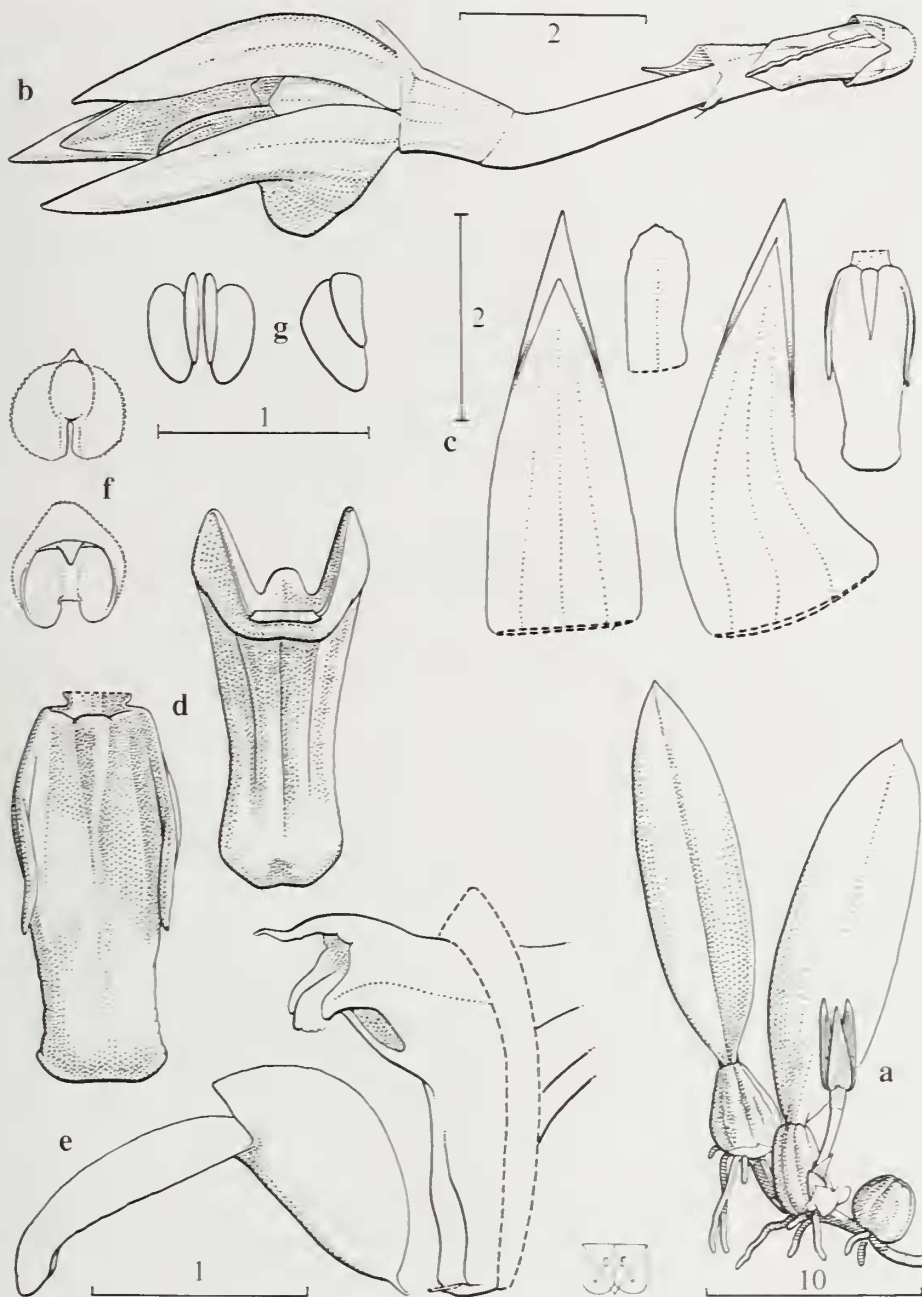


Figure 10. *Bulbophyllum acutilobum* J.J. Verm. & P. O'Byrne. A. Habit; B. Flower; C. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; D. Lip, left: adaxial side, right: abaxial side; E. Column and lip, lateral view; F. Anther, left: adaxial side, right: abaxial side; G. Pollinia, left: two pairs, right: a single pair. All from SBG-O 4912 (spirit sample).

base broadly attached; thin, surface glabrous. **Lip** recurved about half way, general outline approx. ovate, ca 1.9 x 0.9 mm, index ca 2.1 (all without artificial spreading), margins entire; glabrous, three-lobed; midlobe approx. ovate, slightly widened near the tip, truncate-rounded, thick; adaxially with a distinct, retrorse, longitudinal, erect, triangular, obtuse tooth near the base, surface towards the tip slightly convex; abaxially without a median ridge near the base; sidelobes attached along the basal 2/5 of the length of the lip, antrorse, oblique, obovate, acute, thin. Column ca 0.8 mm long, stigma approx. circular, without keels inside, without teeth at its base, column foot without teeth. Stelidia triangular, ca 0.4 mm long, obtuse. Anther abaxially with a distinct, rounded crest, surface papillose, front margin drawn out into a triangular beak. **Pollinia** 4, the inner slightly more than half as long as the outer; obovoid, flattened, the outer obovoid; no appendages present.

Colour: Sepals whitish near the base, pale red with darker red veins up to half-way their length, yellowish green towards the tip. Petals translucent white with a red midvein. Lip purplish red.

Habitat & ecology: Found as an epiphyte in riverine forest. Alt. ca 1000 m. Flowering Apr-Jun, Sep.

Distribution: INDONESIA. Sulawesi, central part (1 specimen seen).

Notes: *Bulbophyllum decurrentilobum* J.J. Verm. & P. O'Byrne, and *B. depressum* King and Pantling, are most similar. Both, however, have acute or acuminate petals and rounded lateral lobes on the lip.

Bulbophyllum auritum J.J. Verm. & P. O'Byrne, *sp. nov.*

A Bulbophyllo masarangico labello lobis lateralibus nonnihil antrorsis, lobi mediani in parte distali sine carina differt. – **Typus:** Indonesia, Sulawesi, central part, SBG-O 5740 (holo, SING). **Fig. 11.**

Roots below the pseudobulbs. **Rhizome** creeping, 1-1.5 mm diam., sections between pseudobulbs 0.4-0.7 cm long, bracts not persistent. **Pseudobulbs** well spaced, ovoid, 0.4-0.7 x 0.4-0.6 cm. Petiole up to 0.5 cm long. **Leaf** blade ovate, 0.7-0.8 x 0.6-0.7 cm, index (length/width) 1.1-1.3; acute. **Inflorescence** 0.8-1 cm long, 1-flowered. Peduncle patent, 0.4-0.5 cm, bracts ca 3, the longest ca 1.5 mm long. Floral bract tubular, ca 1 mm, acute. **Flowers** not fully opening. Pedicel and ovary ca 1 mm long, basal node coinciding with the bract attachment. Median **sepal** recurved, ovate, ca 3.2 x 1.3 mm, index 1.7-1.8; acute, margins entire, base rather broadly attached;

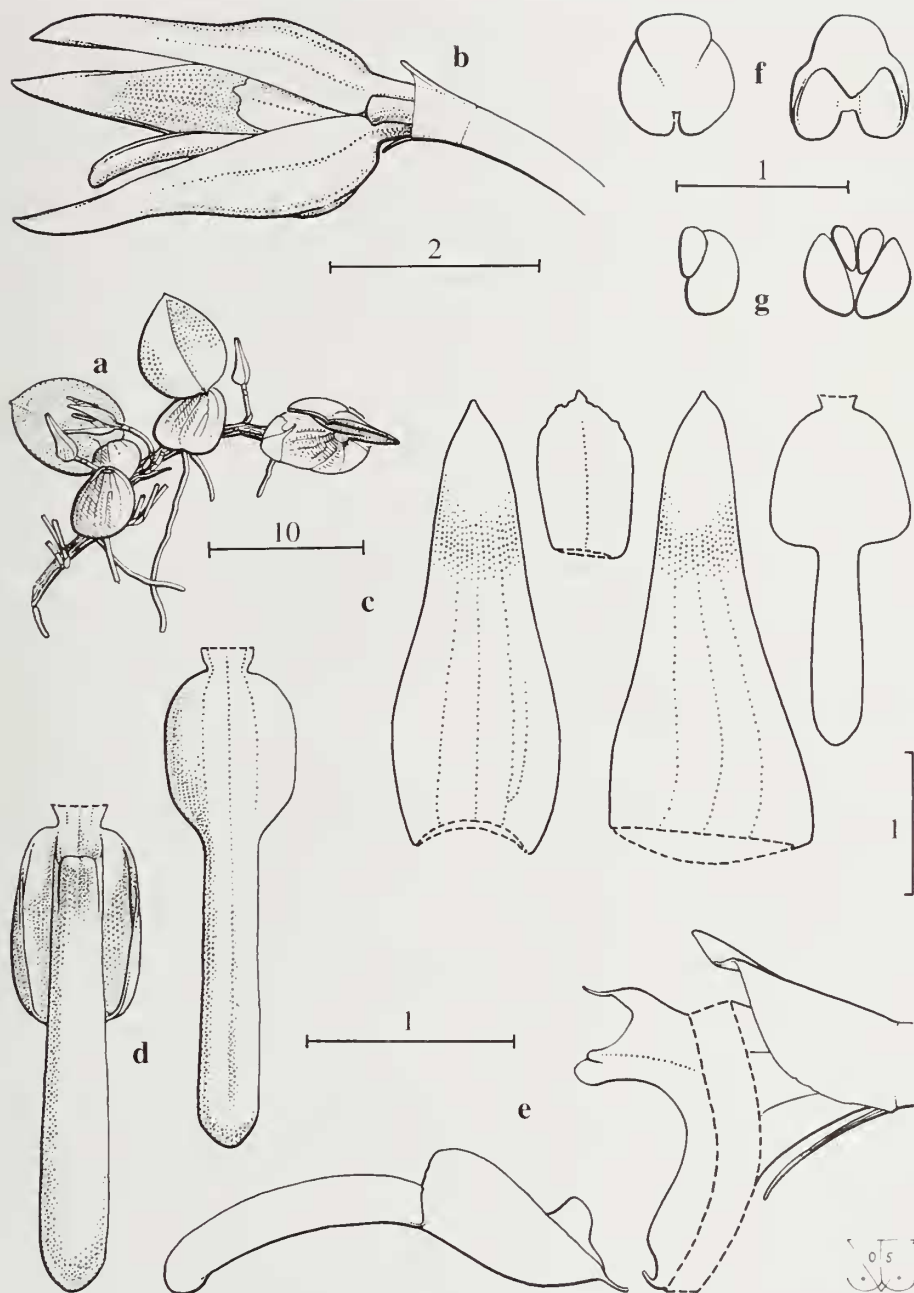


Figure 11. *Bulbophyllum auritum* J.J. Verm. & P. O'Byrne. A. Habit; B. Flower; C. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; D. Lip, left: adaxial side, right: abaxial side; E. Column and lip, lateral view; F. Anther, left: adaxial side, right: abaxial side; G. Pollinia, left: a single pair, right: two pairs. All from SBG-O 5740 (spirit sample).

rather thick, thickened towards the tip, glabrous. Lateral sepals free, oblique, ca 3.3 x 1.5 mm, index ca 2.2; otherwise as the median sepal. **Petals** porrect, obovate, ca 1.2 x 0.7 mm, index ca 1.7; shortly acuminate, margins erose distally, base rather broadly attached; thin, surface glabrous. **Lip** slightly recurved, general outline elliptic with a long drawn-out top part, ca 2.4 x 0.7 mm, index ca 3.4 (all without artificial spreading; when spread subhastate), three-lobed; midlobe approx. linear, slightly widened towards the tip, rounded, margins entire; thick; adaxially with a distinct, longitudinal, erect, subtriangular, obtuse tooth near the base, surface elsewhere slightly convex, very finely papillose locally, abaxially without a median ridge near the base, surface approx. glabrous; sidelobes attached along the basal 2/5 of the length of the lip, antrorse, oblique, ovate, rounded, front margin somewhat erose; thin, surface glabrous. Column ca 0.7 mm long, stigma elliptic, without keels inside, without teeth at its base, column foot with a distinct, rounded swelling just above the ligament. Stelidia triangular, ca 0.4 mm long, obtuse, with a very distinct, antrorse, semi-elliptic tooth protruding beyond the tip of the stelidia along the lower margin. Anther abaxially with a distinct, broadly rounded crest, surface approx. glabrous, front margin drawn out into a triangular beak. **Pollinia** 4, the inner ca half as long as the outer; obovoid, flattened, the outer ellipsoid; no appendages present.

Colour: Sepals yellowish towards the base, yellow towards the tip, in between with a large purplish red patch around the midvein; midvein itself a darker purplish red. Petals translucent white, midvein and top purplish red. Lip blackish purple.

Habitat & ecology: Found as an epiphyte in isolated trees on a wind-swept plateau. Alt. ca 1700 m. Flowering Apr.

Distribution: INDONESIA. Sulawesi, central part (1 specimen seen).

Notes: *Bulbophyllum masarangicum* Schltr. is most similar to the new species, but has a lip with a distinct median ridge over the top part of the midlobe, and semi-elliptic, well-rounded sidelobes.

Bulbophyllum sect. *Intervallatae* Ridl.

Bulbophyllum sect. *Intervallatae* Ridl., J. Linn. Soc., Bot. 31 (1896) 276. –
LECTOTYPE SPECIES: *Bulbophyllum tardeflorens* Ridl. (= *B. attenuatum* Rolfe).

The two new species described below fit best into sect. *Intervallatae* because of their distichous inflorescence with flowers opening in succession. They are most similar to a small number of species traditionally included in a separate section, sect. *Hymenobractea*, a section to be merged with sect. *Intervallatae* (de Witte, in prep.).

The flower structure and the lip shape of both species are reminiscent of S. American species such as *B. micropetalum* Barb. Rodr., and *B. regnellii* Rehb.f. However, a close phylogenetic relationship between the Sulawesi and the S. American species is unlikely.

Bulbophyllum allotrion J.J. Verm. & P. O'Byrne, *sp. nov.*

Bulbophyllum allotrion J.J. Verm. & P. O'Byrne, *inter congeneres asiaticos euronotos inflorescentia laxissima necnon labello hastato singularis.*

— **Typus:** Indonesia, Sulawesi, central part, SBG-O 5072 (holo, SING).

Fig. 12.

Roots mainly below the pseudobulbs. **Rhizome** creeping, 2-3 mm diam., sections between pseudobulbs 0.3-0.8 cm long, bracts not persistent. **Pseudobulbs** close together, ovate, 1.5-2.8 x 0.7-1 cm, without angles. Petiole 1.5-2.7 cm long. **Leaf** blade elliptic, 7-13 x 1.8-2.5 cm, index (length/width) 3-6.9; acute. **Inflorescence** patent, a very lax raceme, 23-50 cm long, up to 15-flowered. Peduncle 21.5-30 cm, bracts 6-7, the longest 5-8 mm long. Rhachis not thickened, up to ca 20 cm long. Floral bracts 4-7 mm, acute. **Flowers** not resupinate, distichous, fully opening, 1-2 at the time. Pedicel and ovary 12-17 mm long, basal node on a ca 3 mm long stump; basal half of the stump fused to the rhachis, top half sticking out perpendicularly. Median **sepal** recurved, subtriangular, ca 8 x 5.5 mm, index 1.4-1.5; acute-acuminate, margins entire, base narrowly attached; rather thin, glabrous. Lateral sepals oblique, ovate-triangular, ca 12 x 4.5 mm, index 2.6-2.7, otherwise as the median sepal. **Petals** approx. porrect, triangular with a distinctly widened base, ca 4.8 x 4.2 mm, index 1.1-1.2; acute, margins entire, base broadly attached; rather thin, glabrous. **Lip** slightly recurved about half-way, general outline approx. hastate, ca 7.5 x 3.4 mm, index ca 2.2-2.4 (all without artificial spreading); acute, margins entire; locally slightly and finely papillose; 3-lobed; midlobe approx. ovate, thick, adaxially slightly concave proximally, with a rounded, not sharply delineated callus about half-way along the length of the lip, slightly convex distally; abaxially with a wide, truncate ridge up to about $\frac{1}{3}$ of the length of the lip, distally slightly concave; lateral lobes attached to the middle $\frac{1}{3}$ of the length of the lip, antrorse, approx. seam-like, gradually widening in the back, obtuse to subacute in front, rather thick. Column ca 2.4 mm long, stigma elliptic, with 2 keels inside, without a tooth

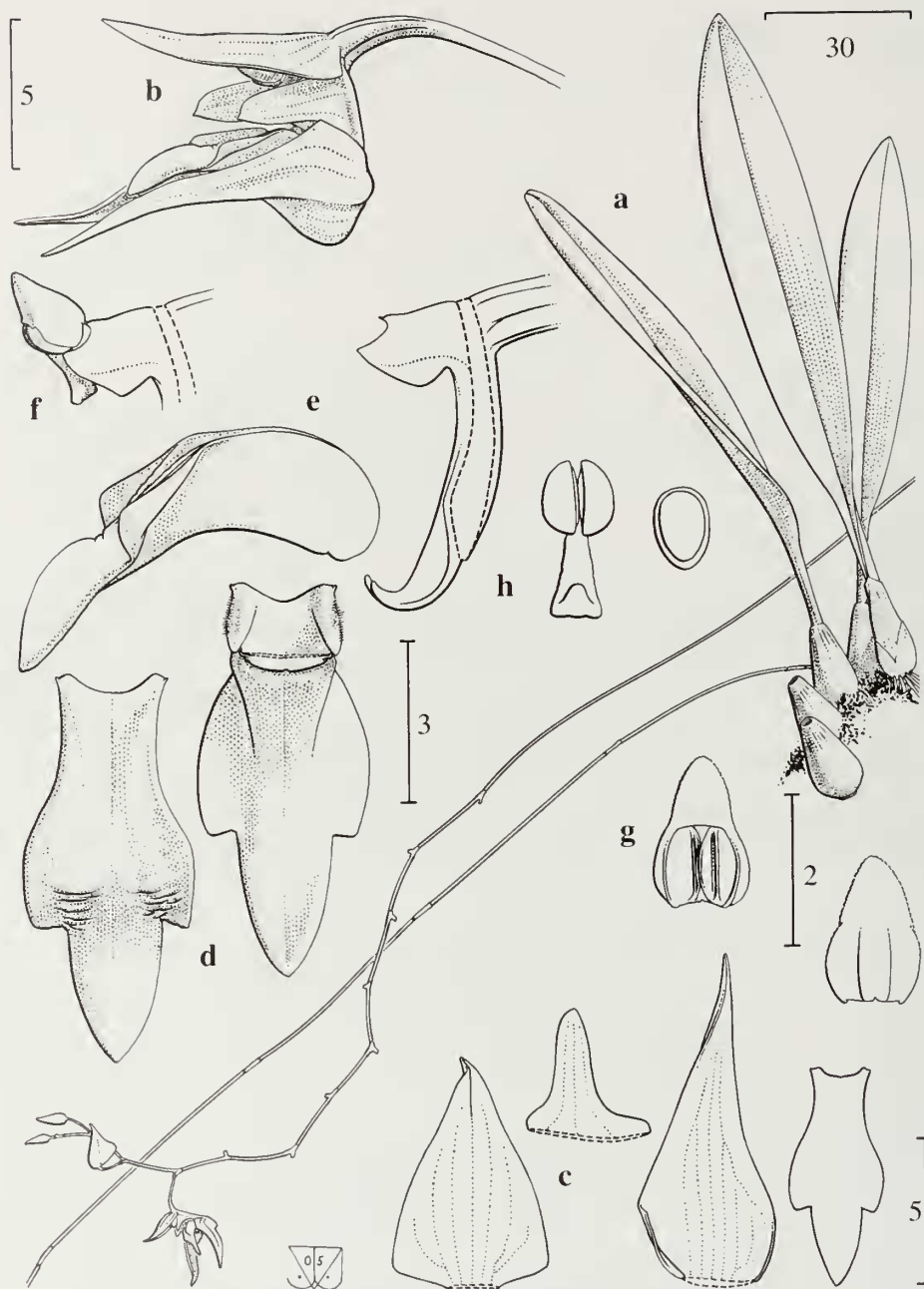


Figure 12. *Bulbophyllum allotrion* J.J. Verm. & P. O'Byrne. A. Habit; B. Flower; C. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; D. Lip, left: adaxial side, right: abaxial side; E. Column and lip, lateral view; F. Column with anther and hamulus; G. Anther, left: adaxial side, right: abaxial side; H. Pollinia, left: two pairs with appendage, right: a single pair. All from SBG-O 5072 (spirit sample).

at its base, column foot elongated, without teeth near its tip. Stelidia ca 1 mm long, triangular, acute, with a rather inconspicuous, deltoid, rounded to obtuse wing along the lower margin. Anther abaxially with a high, triangular, dorsoventrally flattened crest largely overtopping the front margin near the tip and an obtuse ridge near the base, surface slightly papillose, front margin not drawn out. **Pollinia** 4, the inner about as long as the outer, all ellipsoid-ovoid; a long fleshy appendage present, fitting in between the wings along the lower margin of the stelidia.

Colour: Plant medium green. Sepals and petals yellowish green with dark red veins. Lip: basal part, including lateral lobes, pale greenish, locally suffused with some pale red; top part yellow. Column yellowish green. Anther yellow.

Habitat & ecology: Understory epiphyte (sometimes on thickly moss-clad tree trunks near the forest floor) in mossy montane forest. Alt. 1200-1400 m. Flowering Sep-Nov.

Distribution: INDONESIA. Sulawesi, central part (1 specimen seen).

Notes: Uniquely identified among SE Asiatic *Bulbophyllum* by its very lax inflorescence combined with the hastate lip.

Bulbophyllum cymbidioides J.J. Verm. & P. O'Byrne, *sp. nov.*

A Bulbophyllo allotrion labelli lobis lateralibus non antrorsis, antherae operculo sine crista differt. – **Typus:** Indonesia. Sulawesi. Southwest part. SBG-O 5028 (holo. SING). **Fig. 13.**

Roots mainly below the pseudobulbs. **Rhizome** creeping, 1.2-1.5 mm diam., sections between pseudobulbs 0.3-0.6 cm long, bracts not persistent. **Pseudobulbs** close together, ovate, 1.1-2.5 x 0.6-0.9 cm, without angles. Petiole 0.5-1.4 cm long. **Leaf** blade elliptic to ovate, 2.9-8.2 x 0.8-1.2 cm, index (length/width) 3.6-7.5; acute. **Inflorescence** patent, a very lax raceme, 7-18 cm long, up to 4-flowered. Peduncle 5.7-11 cm, bracts 4-5, the longest 3.5-4.5 mm long. Rhachis not thickened, up to ca 5.7 cm long. Floral bracts ca 4 mm, acute. **Flowers** not resupinate, distichous, fully opening, 1-2 at the time. Pedicel and ovary 12-14 mm long, basal node on a ca 5 mm long stump; basal half of the stump fused to the rhachis, top half sticking out obliquely. Median **sepal** recurved, subtriangular, ca 9.5 x 6.5 mm, index 1.4-1.5; acuminate, margins entire, base narrowly attached; rather thin, glabrous. Lateral sepals oblique, ovate-triangular, ca 12 x 7 mm, index ca 1.7, otherwise as the median



Figure 13. *Bulbophyllum cymbidioides* J.J. Verm. & P. O'Byrne. A. Habit; B. Flower; C. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; D. Lip, left: adaxial side, right: abaxial side; E. Column and lip, lateral view; F. Anther, left: adaxial side, right: abaxial side; G. Pollinia, left: a single pair, right: two pairs, with appendage. – All from SBG-O 5028 (spirit sample).

sepal. **Petals** approx. porrect, obliquely deltoid with a somewhat widened base, ca 5 x 6.2 mm, index ca 0.8; subacute, margins entire, base broadly attached; rather thin, glabrous. **Lip** recurved, general outline ovate, ca 7.2 x 4 mm, index ca 1.8 (all without artificial spreading); obtuse, margins entire; glabrous; 3-lobed; midlobe approx. ovate, rather thick, adaxially concave proximally, with a transverse, antrorse deltoid, obtuse, thick median tooth near the base, slightly convex distally; abaxially with a wide, truncate ridge up to about $\frac{1}{3}$ of the length of the lip, distally slightly concave; lateral lobes attached to the proximal $\frac{1}{2}$ of the length of the lip, semi-circular. Column ca 3 mm long, stigma ovate, with 2 keels inside, without a tooth at its base, column foot elongated, widened but without teeth near its tip. Stelidia ca 1 mm long, triangular, acute, with a rather inconspicuous, deltoid, rounded to obtuse wing along the lower margin. Anther abaxially virtually without a crest, surface glabrous, front margin not drawn out. **Pollinia** 4, the inner slightly shorter than the outer and distinctly flattened; a long fleshy appendage present, fitting in between the wings along the lower margin of the stelidia.

Colour: Median sepal translucent greenish, veins dull red, margins white. Lateral sepals whitish, greenish at the tip, with some dull red markings following the veins near the base. Lip: top part white, lateral lobes greenish, basal half spotted purple along the midvein and near its base

Habitat & ecology: Remnants of very wet, low and open montane woodland. Understory epiphyte on bushes, but also in the crowns of emergent trees. Alt. 1600-2200 m. Flowering Jan-Apr, Oct.

Distribution: INDONESIA. Sulawesi, southwest part (1 specimen seen).

Notes: Differs from *B. allotrion* in the not-antrorse sidelobes of the lip, and the lack of a crest on the anther cap.

***Bulbophyllum* sect. *Leopardinae* Benth. & Hook.f.**

Bulbophyllum sect. *Leopardinae* Benth. & Hook.f., Gen. Pl. 3 (1883) 503. – TYPE SPECIES (a lit. reference given only): *Dendrobium leopardinum* Wall. [= *Bulbophyllum leopardinum* (Wall.) Lindl.]

Bulbophyllum sect. *Beccarianae* Pfitz. in Engler & Prantl, Nat. Pflanzenfam., ed. 2, 6 (1889) 179. – TYPE SPECIES: *Bulbophyllum* ("Bulbophyllum") *beccarii* Rehb.f.

Bulbophyllum sect. *Pahudia* Schltr., Feddes Repert. 10 (1911) 93; Garay, Hamer & Siegerist, Nord. J. Bot. 14 (1994) 630. – LECTOTYPE SPECIES (designated by Garay, Hamer & Siegerist): *Cirrhopetalum pahudii* De Vriese [= *B. pahudii* (De Vriese) Rchb.f.].

Bulbophyllum sect. *Pahudiella* Garay, Hamer & Siegerist, Nord. J. Bot. 14 (1994) 629. – TYPE SPECIES: *Bulbophyllum subumbellatum* Ridl.

Here, sect. *Leopardinae* is segregated from sect. *Sestochilus* (Breda) Benth. & Hook.f., and sect. *Stenochilus* J.J. Sm., to accommodate a series of species which have the node between the peduncle and the pedicel more or less coinciding with its bract, or have the distance between this node and its bract not exceeding 1.5 times the diameter of the pedicel at its base. In sect. *Sestochilus* as well as sect. *Stenochilus* the distance between the node and its bract equals or exceeds 2 times the diameter of the pedicel at its base. A selection of species included in sect. *Leopardinae* can be found in Vermeulen (1991), under sect. *Sestochilus*, but with the exclusion of the following: *B. apheles* J.J. Verm., *B. dearei* Rchb.f., *B. lobbii* Lindl. (all sect. *Sestochilus*), and *B. cheiri* Lindl., *B. macranthum* Lindl., and *B. patens* King (all sect. *Stenochilus*). A revision including the three sections mentioned is in preparation.

Among our Sulawesi material is one new species of sect. *Leopardinae*:

Bulbophyllum deviantiae J.J. Verm. & P. O'Byrne, sp. nov.

A *Bulbophyllis* incisilabro *et* *B. rugoso labelli parte apicali distincte papillosa, et a* *B. maculoso ovario jugis lateralibus distincte sinuosis differt.* – **Typus:** Indonesia, Sulawesi, central part, SBG-O 5057 (holo, SING). **Fig. 14.**

Roots mainly below the pseudobulbs. **Rhizome** 2-2.5 mm diam., sections between pseudobulbs 0.8-1.2 cm long, bract fibres hardly persistent. **Pseudobulbs** loosely clustered, ovoid to almost cylindrical, 1-2.1 x 0.4-0.7 cm. Petiole 0.2-2.2 cm. **Leaf** blade elliptic to ovate, 4.5-8.6 x 1-1.4 cm, index (length/width) 3.7-6.6; acute. **Inflorescence** erect to patent, ca 4 cm long, 1-flowered. Peduncle ca 1 cm, bracts ca 2, the longest 6-7 mm long. **Floral** bracts elliptic to ovate, ca 9 x 6 mm, acute. **Flowers** resupinate, opening wide. Pedicel and ovary ca 30 mm long, basal node approx. coinciding with the attachment of the floral bract; ovary ribs with the crests sharply angular, all distinctly sinuous near the flower except the rib opposing the median sepal. **Sepal** recurved to spreading, elliptic-ovate, ca 18 x 7.5 mm, index 2.2-2.3; subacute, margins entire, base rather broadly attached; rather thick; glabrous. Lateral sepals free, ovate-triangular, ca 18 x 8 mm, index 2.2-2.3,

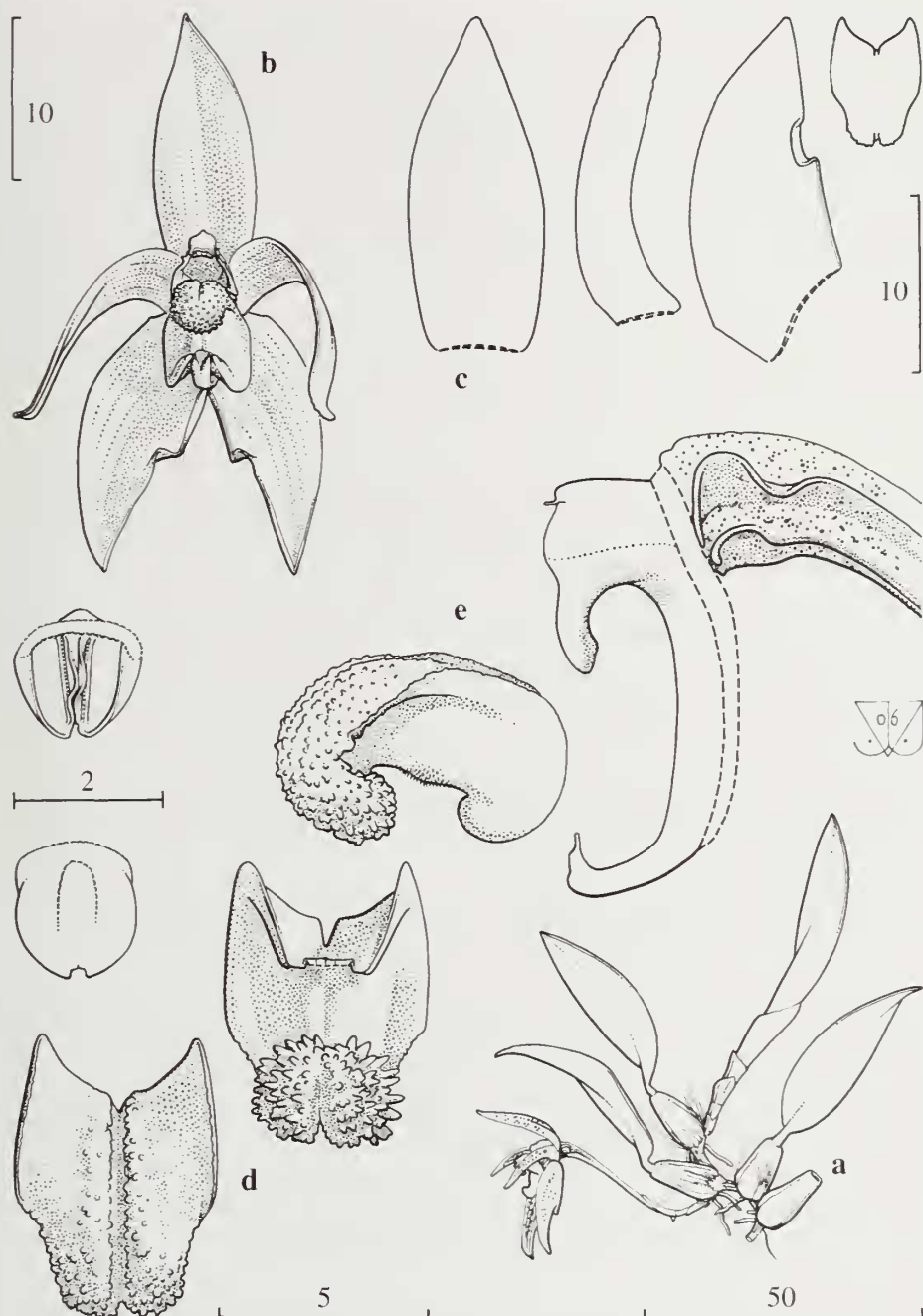


Figure 14. *Bulbophyllum deviantiae* J.J. Verm. & P. O'Byrne. A. Habit; B. Flower; C. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; D. Lip, left: adaxial side, right: abaxial side; E. Column and lip, lateral view; F. Anther, above: adaxial side, below: abaxial side. All from SBG-O 5057 (spirit sample).

acute; otherwise as the median sepal. **Petals** spreading with incurved tips, ovate-oblong, ca 18 x 4 mm, index ca 4.5; subacute, margins slightly erose distally, base broadly attached; rather thick, glabrous. **Lip** recurved towards the base and towards the tip, ovate-oblong, ca 6.5 x 5 mm, index ca 1.3 (all without artificial spreading), rounded, margins entire proximally, from about $\frac{1}{3}$ of the length of the lip increasingly erose, thick; adaxially with a distinct median furrow over its entire length, concave and glabrous towards the base except for a irregularly verrucate strip bordering the median furrow, convex and coarsely and distinctly verrucate towards the tip; abaxially with a retuse median ridge over most of its length, surface glabrous except for a finely papillose patch in the centre. Column 3 mm long, stigma inside with 3 keels, at its base without teeth, column foot not widened at the tip. Stelidia inconspicuous, deltoid, ca 0.05 mm, rounded, with a distinct, patent, recurved, strap-shaped, obliquely truncate tooth along the lower margin, near the top of the column. Anther abaxially colliculate and with a rounded crest; front margin somewhat papillose. **Pollinia** (not seen).

Colours: Young leaves with numerous small red spots. Sepals and petals yellow the sepals densely spotted and stained with brownish red, the petals less densely so. Lip orange yellow, adaxially bright red towards the tip. Column yellow, stained with some red.

Habitat & ecology: Understory epiphyte in montane forest. Alt. 1200-1400 m. Flowering Jan-May, Aug, Sep.

Distribution: INDONESIA. Sulawesi, central part (1 specimen seen).

Notes: This is part of a small group of species around *B. membranifolium* Hook.f.; it shares the spreading (not fused or at least contiguous) lateral sepals with *B. incisilabrum* J.J. Verm. & P O'Byrne, *B. rugosum* Ridl., and a taxon of doubtful status known as *B. maculosum* Ames. It differs from the first two in having a distinctly papillose top part of the lip, from the latter in having distinctly sinuous lateral juga on the ovary. The plants that we have seen of *B. deviantiae* are smaller than any other of the species mentioned.

Named after Devianti, daughter of Tampang, Rantepao, Sulawesi.

***Bulbophyllum* sect. *Macrocaulia* (Bl.) Aver.**
(= sect. *Monilibulbus*)

Diphyes sect. *Macrocaulia* Bl., Bijdr. Fl. Ned. Ind. (1825) 318. – *Bulbophyllum*

sect. *Macrocaulia* (Bl.) Aver., Identification Guide to Vietnamese Orchids (1994) 279. – LECTOTYPE SPECIES (here designated): *Diphyes ovalifolia* Bl. [*Bulbophyllum ovalifolium* (Bl.) Lindl.].

Diphyes sect. *Diasperia* Bl., Bijdr. Fl. Ned. Ind. (1825) 317. – LECTOTYPE SPECIES (here designated): *Diphyes cernua* Bl. [= *B. cernuum* (Bl.) Lindl.].

Bulbophyllum sect. *Odoardiana* Pfitz. in Engler & Prantl. Nat. Pflanzenfam., ed. 2, 6 (1889) 179. – TYPE SPECIES: *Bulbophyllum odoardii* Rchb.f. & Pfitz.

Bulbophyllum sect. *Monilibulbus* J.J. Sm., Bull. Jard. Bot. Buitenzorg. Ser. 2, 13 (1914) 33. – LECTOTYPE SPECIES: *Diphyes inaequalis* Bl. [*Bulbophyllum inaequale* (Bl.) Lindl.].

Bulbophyllum torajarum J.J. Verm. & P. O'Byrne, *sp. nov.*

A *Bulbophyllis* *catenario* et *B. carunculilabrum labelli* forma sine explicatione artificiali: ad apicem gradatim coarctatus sine constrictione distincta pare ubi margines convenient supra paginam abaxialem, sepalo mediano triangulari differt. – **Typus:** Indonesia, Central Sulawesi, SBG-O 3205 (holo. SING). **Fig. 15.**

Roots below the pseudobulbs. **Rhizome** creeping, 0.8–1 mm diam., sections between pseudobulbs 0.4–0.7 cm long, bracts not persistent. **Pseudobulbs** ovoid, basal half prostrate on and fused to the rhizome, so that the new pseudobulbs arise c. half-way up the old, 0.5–0.7 x 0.2–0.4 cm. Petiole 3–4 mm long. **Leaf** blade elliptic, 0.8–1.5 x 0.25–0.7 cm, index (length/width) 2.1–3.7; obtuse. **Inflorescence** 3–4 cm long, 1-flowered. Peduncle erect to patent, 1.8–2.8 cm, bracts 2, the longest ca 1.8 mm long. Floral bracts tubular, 1.2–1.8 mm, acute. **Flowers** fully opening. Pedicel and ovary 6–8 mm long, basal node on a 0.8–1 mm-long stump. Median **sepal** approx. porrect or somewhat recurved, triangular, ca 4.5 x 1.4 mm, index ca 3.2; acute-acuminate, margins entire, finely papillose-ciliolate, base widely attached; rather thin, adaxially glabrous, abaxially with papillose-ciliolate veins. Lateral sepals recurved, free, oblique, approx. elliptic, ca 6.7 x 3.1 mm, index 2.1–2.2; acute; rather thick, otherwise as the median sepal. **Petals** porrect, elliptic-obovate, ca 1.7 x 0.9 mm, index 1.8–1.9; subacute, margins entire, base rather narrowly attached; thin, glabrous. **Lip** recurved near the base, ovate in general outline with the margins folded back over the abaxial side and touching one another, ca 3 x 1.8 mm, index 1.6–1.7 (all without artificial spreading), slightly truncated, margins somewhat erose; thick; adaxially concave near the base, with 2 short ridges starting near the margins at about ¼ of the length of the lip, converging and continuing up to about ½ the length of the lip, their distal end

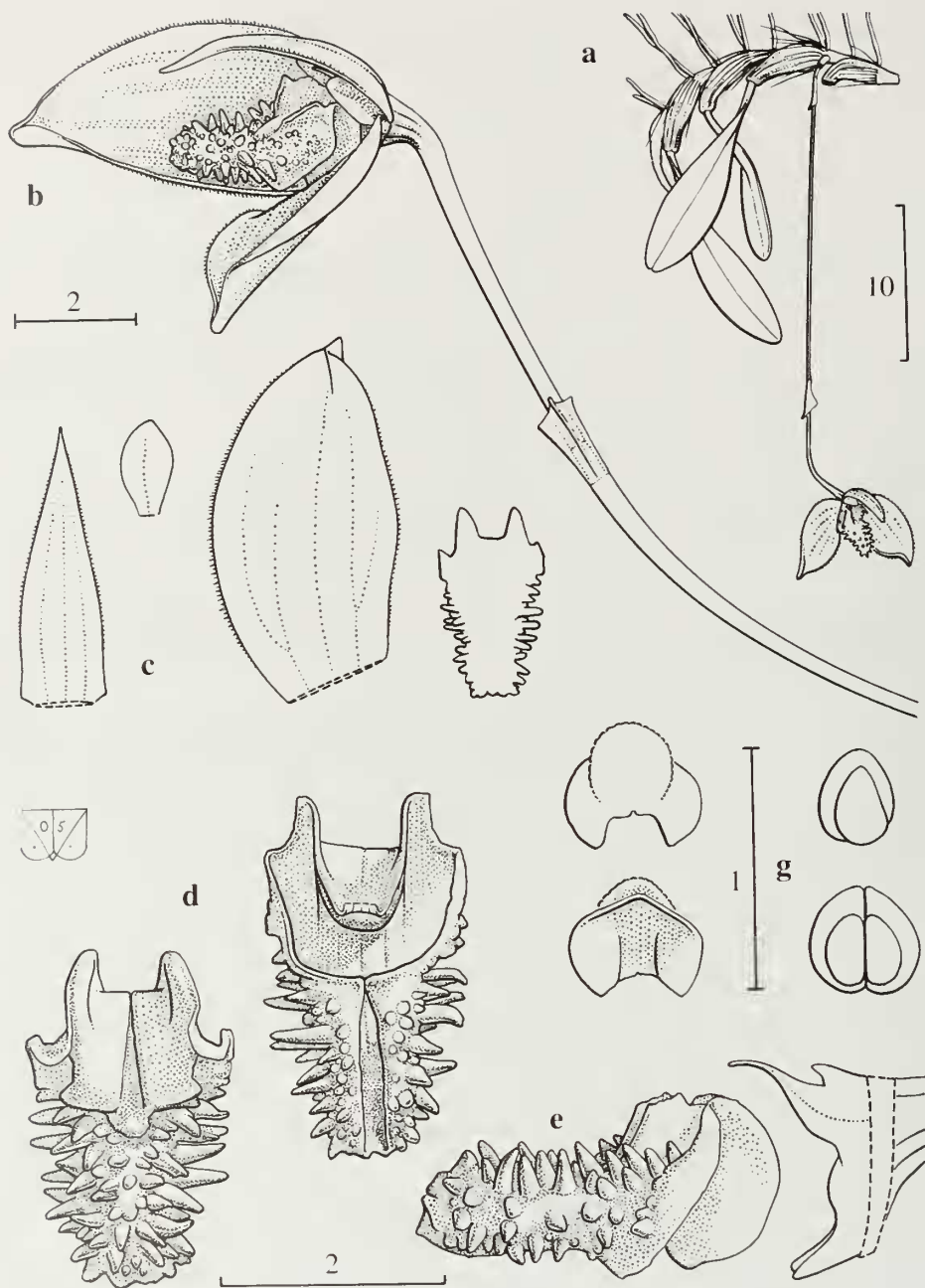


Figure 15. *Bulbophyllum torajaraum* J.J. Verm. & P. O'Byrne. A. Habit; B. Flower; C. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; D. Lip, left: adaxial side, right: abaxial side; E. Column and lip, lateral view; F. Anther, above: abaxial side, below: adaxial side; G. Pollinia, above: a single pair, below: two pairs. All from SBG-O 3205 (spirit sample).

clasping a small, rounded callus, lip surface convex towards the tip and with large, conical verrucae, abaxially with a rounded median ridge near the base, surface glabrous. Column ca 1.2 mm long, stigma without a tooth at its base, column foot without teeth. Stelidia narrowly triangular-subulate, ca 0.9 mm long, acute. Anther abaxially with a widely rounded crest, surface papillose, front margin not drawn out. **Pollinia** 4, the inner ca $\frac{2}{3}$ as long as the outer, flattened, all ellipsoid-ovoid; no appendages present.

Colour: Median sepal translucent yellowish with orange veins. Lateral sepals orange towards the base, yellow towards the tip. Petals yellow with a darker midvein. Lip orange red towards the base, orange towards the tip.

Habitat & ecology: Understorey epiphyte in montane forest, at 2000-2500 m alt. Flowering Mar-May, Jul-Nov.

Distribution: INDONESIA. Sulawesi, central part (1 specimen seen).

Notes: In the general flower shape *B. torajarum* is most similar to *B. catenarium* Ridl. and *B. carunculaelabrum* Carr. All three have a lip that, when spread out, widens abruptly at $\frac{1}{3}$ – $\frac{1}{2}$ of its length. The margins are folded backwards and meeting over the adaxial surface. *B. torajarum* differs from the other two in the shape of the lip without spreading: it narrows gradually towards the tip, without a distinct constriction at the level where the margins meet over the abaxial surface, as in the other two. It furthermore differs from both in having a triangular (not an elliptic) median sepal.

***Bulbophyllum* sect. *Minutissima* Pfitz.**

(= sect. *Nematorhizis*)

Bulbophyllum sect. *Minutissima* Pfitz. in Engler & Prantl, Nat. Pflanzenfam., ed. 2, 6 (1889) 180. – TYPE SPECIES: *Bulbophyllum* ("Bulbophyllum") *minutissimum* V. Muell.

Bulbophyllum sect. *Nematorhizis* Schltr., Feddes Repert. Beih. 1 (1913) 701 & 790. – LECTOTYPE SPECIES (here designated): *Bulbophyllum nematorhizis* Schltr.

***Bulbophyllum insipidum* J.J. Verm. & P. O'Byrne, sp. nov.**

A *Bulbophyllo* perpusillo foliis 3.2–4.8 cm longis a *B. keekee* labello ad apicem sine callo minuto differt. – **Typus**: Indonesia, Sulawesi, central part, SBG-O 4804 (holo, SING). **Fig. 16.**

Roots along the entire rhizome. **Rhizome** creeping, 2-2.5 mm diam., sections between pseudobulbs 0.3-0.5 cm long, bracts little persistent. **Pseudobulbs** close together, ellipsoid to ovoid, 0.7-1.2 x 0.4-0.7 cm. Petiole 0.4-0.8 cm long. **Leaf** blade elliptic to ovate, 3.2-4.8 x 0.6-1.1 cm, index (length/width) 3.6-5.3; acute. **Inflorescence** 2.2-3.5 cm long, 1-flowered. Peduncle patent, 1.5-1.7 cm, bracts ca 3, the longest ca 3.5 mm long. Floral bract tubular, ca 3 mm, acute. **Flowers** hardly opening. Pedicel and ovary 13-14 mm long, basal node on a ca 1 mm long stump. Median **sepal** porrect, ovate, ca 2.7 x 1.5 mm, index ca 1.8; subacute, margins entire, base broadly attached; rather thick, glabrous. Lateral sepals free, oblique, ovate-triangular, ca 2.7 x 2.7 mm, index ca 1; otherwise as the median sepal. **Petals** porrect, elliptic, ca 2 x 0.6 mm, index ca 3.3-3.4; obtuse, margins entire; base rather broadly attached; thin, surface approx. glabrous. **Lip** strongly recurved about half-way, general outline obovate-subhastate, ca 2 x 1.2 mm, index 1.6-1.7 (all without artificial spreading), obtuse, margins approx. entire, thin proximally, thick distally, surface slightly papillose distally; adaxially somewhat concave up to $\frac{2}{3}$ of its length, with two slight, obtuse ridges near the margin slightly over half-way its length, top $\frac{1}{3}$ convex; abaxially with a slight, rounded ridge up to half-way along the length of the lip. Column ca 1.5 mm long, stigma subtriangular, without keels inside, without teeth at its base, column foot tapering towards its tip, without lateral teeth. Stelidia triangular, ca 0.7 mm long, subacute. Anther abaxially with a rounded crest, surface glabrous, front margin drawn out, concave, obtuse. **Pollinia** 4, ovoid, the inner about $\frac{2}{3}$ as long as the outer, distinctly flattened; no appendages present.

Colour: Sepals whitish, stained with pale pinkish red, yellowish towards the tip.

Habitat & ecology: Found as an understory epiphyte in secondary forest near a stream. Alt. ca 1450 m. Flowering Apr-Sep.

Distribution: INDONESIA. Sulawesi, central part (1 specimen seen).

Notes: The general shape of the flowers, including the tapering column foot, fits well in sect. *Minutissima*. The densely crowded pseudobulbs are very unusual in the section. *B. perpusillum* Ridl., from Sarawak, grows in similar tufts, but is a much smaller plant of slightly over one cm high, with acute-acuminate sepals and petals and an acute lip. *B. keekee* Halle, from New Caledonia, has similarly shaped flowers, but with a suborbicular lip with a small callus near the tip.

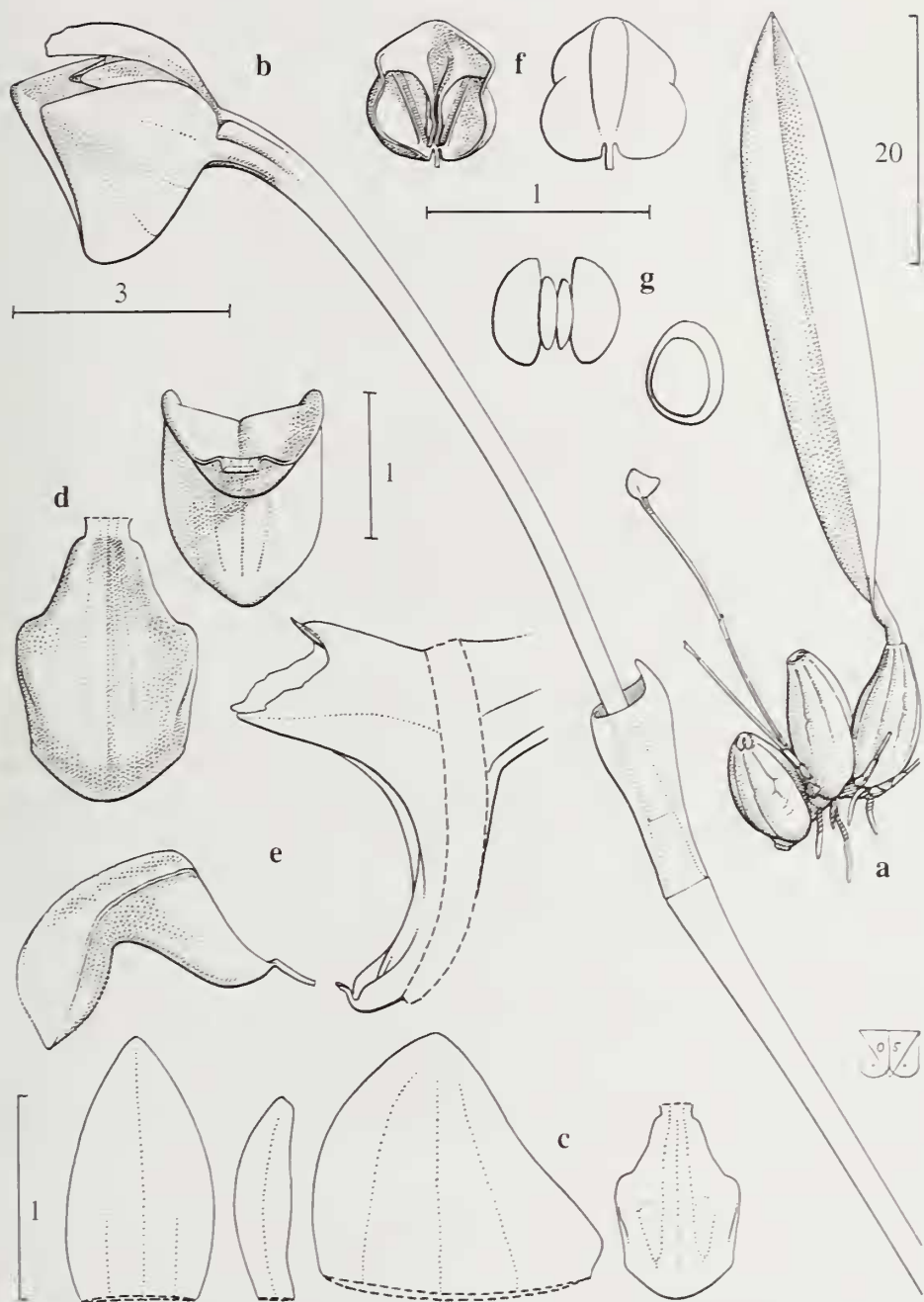


Figure 16. *Bulbophyllum insipidum* J.J. Verm. & P. O'Byrne. A. Habit; B. Flower; C. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; D. Lip, left: adaxial side, right: abaxial side; E. Column and lip, lateral view; F. Anther, left: adaxial side, right: abaxial side; G. Pollinia, left: two pairs, right: a single pair. All from SBG-O 4804 (spirit sample).

***Bulbophyllum* sect. *Monanthaparva* Ridl.**

Bulbophyllum sect. *Monanthaparva* Ridl., J. Linn. Soc., Bot., 32 (1896) 269; Van Royen, Alpine Fl. New Guinea 2 (1979) 207, sub sect. *Schlechteria*, see note below. – LECTOTYPE SPECIES (here designated): *B. striatellum* Ridl.

Bulbophyllum sect. *Scyphosepalum* Schltr., Feddes Repert. Beih. 1 (1913) 701, 793; Van Royen, Alpine Fl. New Guinea 2 (1979) 217. – LECTOTYPE SPECIES (here designated): *Bulbophyllum muruanum* Schltr.

Van Royen (l.c.) synonymised sect. *Monanthaparva* with sect. *Schlechteria* (= sect. *Micromonantho*, here synonymised with sect. *Polymeres*, see below), without indicating a lectotype from among the species listed by Ridley with the original description of the section. These species would now be included in various sections; we choose *B. striatellum* Ridl., as a lectotype so that the sectional name can be used for a group of species identified below. Doing so, the taxonomic contents of the section differs from that implied by Van Royen.

The species included here are most similar to sect. *Hybochilus* Schltr., but differ in having the basal node of the pedicel 0.4–4 mm above the attachment of the floral bract (level with the attachment of the floral bract in sect. *Hybochilus*). Additional differences include: pedicel usually elongated (versus short to virtually absent); lip entire (versus obscurely or distinctly three lobed); median ridge on the lip absent or inconspicuous (versus usually distinct, often with an erect tooth proximally).

Marked similarity also exists between sect. *Monanthaparva* and sect. *Polymeres* (see below), but sect. *Monanthaparva* lacks the widened column foot (usually with a protrusion on each side of the ligament) that characterizes sect. *Polymeres*. The delimitation to sect. *Hybochilus* may still need some adjustments, but the following species are included in sect. *Monanthaparva*, with the species of which material has been checked for the diagnostic character marked with an asterisk:

B. ascochiloides J.J. Sm.
B. camptochilum J.J. Verm.*
B. cavipes J.J. Verm.*
B. ciliatum (Bl.) Lindl.*
B. comberi J.J. Verm.*
B. delicatulum Schltr.
B. furcatum Aver.

B. lipense Ames
B. lordoglossum J.J. Verm.*
B. marudiense Carr*
B. membranaceum Teysm. & Binnend.*
B. menghinense Tsi
B. pachyneuron Schltr.*
B. papillatum J.J. Sm.*

B. furcillatum J.J. Verm.*

B. sensile Ames

B. grudense J.J. Sm.*

B. striatellum Ridl.*

B. hemiprionotum J.J. Verm.*

B. truncatum J.J. Sm.*

B. iterans J.J. Verm. & P. O'Byrne* and *B. trichorhachis* J.J. Verm. & P. O'Byrne* can also be included, but have a racemose inflorescence.

Our investigation has yielded three new species:

Bulbophyllum clinopus J.J. Verm. & P. O'Byrne, *sp. nov.*

A *Bulbophyllo* pachyneuron *foliis ellipticis obtusis, inflorescentia multo brevior* (2.5–3 cm longa in *B. pachyneuron*) *differt.* – **Typus:** Indonesia, Sulawesi, central part. *cult. Jongejan 387* (holo, L). **Fig. 17.**

Roots scattered along the rhizome. **Rhizome** long creeping, 1–1.5 mm diam., sections between pseudobulbs 1.3–3 cm long, bracts not persistent. **Pseudobulbs** widely spaced, patent, ovoid, 0.8–0.9 x 0.6–0.7 cm. **Petiole** up to 0.2–0.3 cm long. **Leaf** blade elliptic, 1.3–2 x 0.6–0.7 cm, index (length/width) 2.1–2.9; obtuse. **Inflorescence** ca 1 cm long, 1-flowered. Peduncle patent, ca 1.5 mm, bracts ca 2, the longest ca 1.8 mm long. Floral bract tubular, ca 1.8 mm, acute. **Flowers** not fully opening. Pedicel and ovary strongly curved, ca 4.5 mm long, basal node on a ca 0.5 mm long stump. Median **sepal** approx. porrect, ovate, ca 3 x 1.7 mm, index 1.7–1.8; apiculate, margins papillose towards the tip, base broadly attached; rather thick, surface glabrous. Lateral sepals free, recurved, oblique, elliptic, ca 4.5 x 2.5 mm, index ca 1.8, margins glabrous; otherwise as the median sepal. **Petals** porrect, oblong, ca 1.8 x 0.6 mm, index ca 3; obtuse, margins slightly erose towards the tip; base broadly attached; rather thin, surface glabrous. **Lip** approx. straight, general outline elliptic-ovate, ca 2 x 1.2 mm, index 1.6–1.7 (all without artificial spreading), rounded, margins papillose; thick, surface glabrous but papillose towards the margins; adaxially concave towards the base, with two inconspicuous, obtuse ridges starting near the base, converging towards the tip and continuing over about $\frac{3}{4}$ of the length of the lip; abaxially with a weak, retuse ridge over most of its length. Column ca 1.8 mm long, stigma elliptic, without keels inside, with a very slight callus at its base, column foot not widened, hardly thickened, without teeth. Stelidia triangular, ca 0.7 mm long, acute. Anther abaxially with a rounded crest towards the base and a flat beak towards the tip, surface somewhat papillose, front margin hardly drawn out, rounded, somewhat erose. **Pollinia** 4, the inner somewhat shorter than the outer, flattened.

Colour: Sepals and petals whitish, suffused with purplish red, veins dark

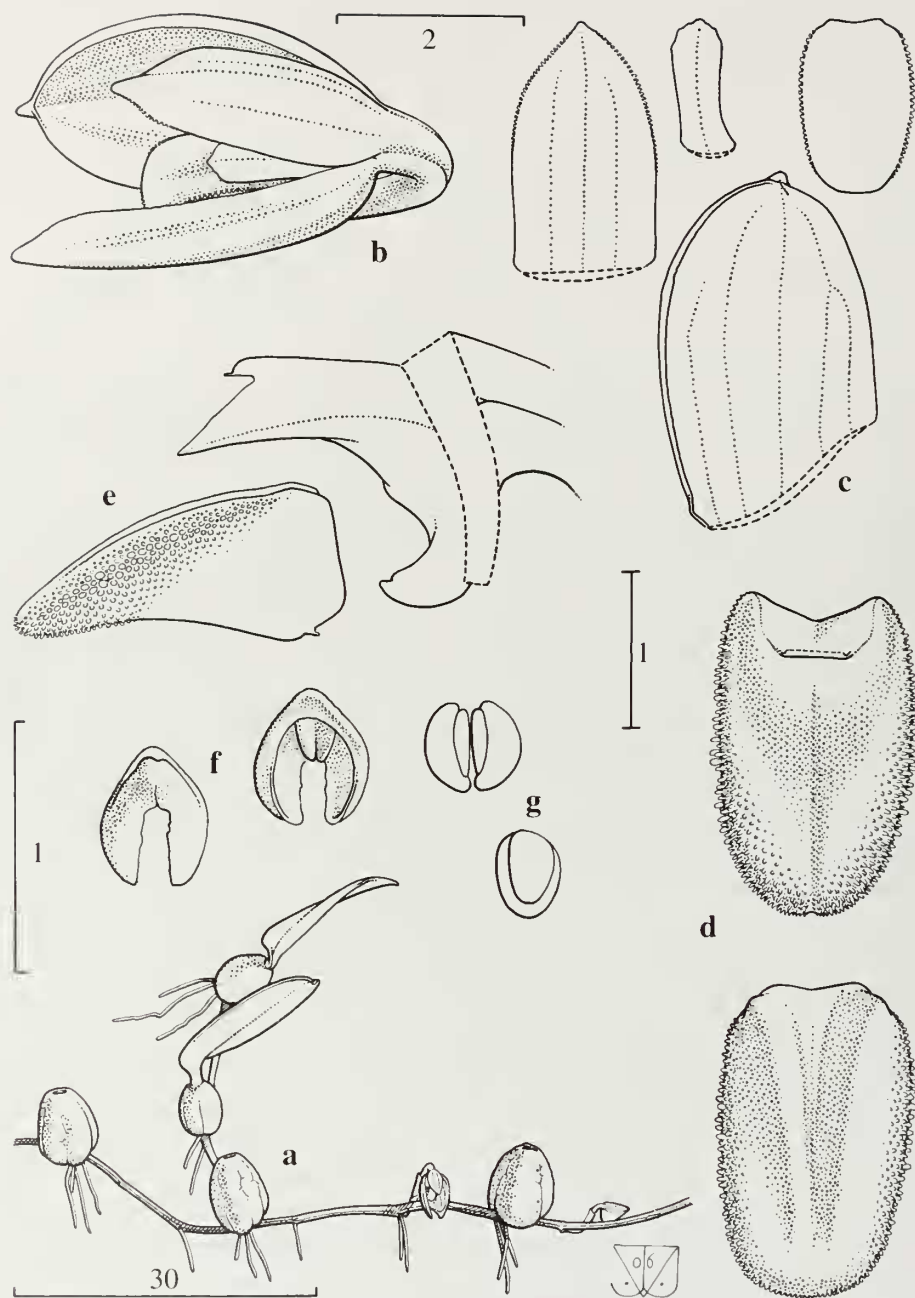


Figure 17. *Bulbophyllum clinopus* J.J. Verm. & P. O'Byrne. A. Habit; B. Flower; C. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; D. Lip, left: adaxial side, right: abaxial side; E. Column and lip, lateral view; F. Anther, left: abaxial side, right: adaxial side; G. Pollinia, above: two pairs, below: a single pair. All from *Jongejan 387* (spirit sample).

purplish red. Lip dark purplish red, whitish near base. Column white with a few pinkish specks, column foot stained dark red.

Habitat & ecology: No information available.

Distribution: INDONESIA. Sulawesi, central part (1 specimen seen).

Notes: Most similar to *B. pachyneuron* Schltr. also from Sulawesi, but easily distinguished by the elliptic, obtuse leaves (not ovate and acute, as in *B. pachyneuron*), and the much shorter inflorescence (2.5-3 cm long in *B. pachyneuron*).

Bulbophyllum ecristatum J.J. Verm. & P. O'Byrne, *sp. nov.*

A *Bulbophyllo* ciliato *petalis brevioribus latioribusque* (2.5—3 mm longis, longitudinis / latitudinis indice 3—4 in *B. ciliato*), *labello ovato* (*sine explicatione artificiali*) *steliidiis brevioribus acutis differt.* — **Typus**: Indonesia, Sulawesi, central part, SBG-O 4399 (holo, SING). **Fig. 18.**

Roots below the pseudobulbs. **Rhizome** creeping, 0.8-1 mm diam., sections between pseudobulbs 0.8-1.1 cm long, bracts not persistent. **Pseudobulbs** well spaced, ovoid, 0.4-0.6 x 0.3-0.5 cm. Petiole up to 0.05 cm long. **Leaf** blade elliptic, 0.9-1.2 x 0.4-0.5 cm, index (length/width) 2.2-2.4; obtuse. **Inflorescence** ca 1.4 cm long, 1-flowered. Peduncle patent, ca 0.8 cm, bracts ca 3, the longest ca 1 mm long. Floral bract tubular, ca 1.2 mm, acute. **Flowers** not fully opening. Pedicel and ovary ca 1.9 mm long, basal node on a ca 0.8 mm long stump. Median **sepal** recurved, triangular, ca 4.3 x 1.2 mm, index ca 3.6; acute, margins entire, base rather broadly attached; rather thin, somewhat thickened towards the tip, adaxially finely papillose towards the tip. Lateral sepals free, oblique, ca 6 x 1.7 mm, index ca 3.5; otherwise as the median sepal. **Petals** porrect, triangular, ca 1.2 x 0.7 mm, index ca 1.7; acute, margins erose distally, base broadly attached; thin, surface glabrous. **Lip** recurved half-way, general outline ovate, ca 1.1 x 0.4-0.5 mm, index 2.2-2.8 (all without artificial spreading; when spread hastate), three-lobed; midlobe ovate, rounded, margins entire, about half-way along the length of the lip with flat, elliptic, obtuse paleae ca 0.1 mm long; rather thick; adaxially concave, surface approx. glabrous, abaxially with a rounded median ridge near the base, surface elsewhere convex, papillose towards the tip; sidelobes attached along the basal ½ of the length of the lip, slightly retrorse, oblique, triangular, obtuse, front margin with paleae as above, back margin entire; rather thin, surface glabrous. Column ca 0.9 mm long, stigma obovate, without keels inside, without teeth at its base, column foot with a slight, rounded swelling

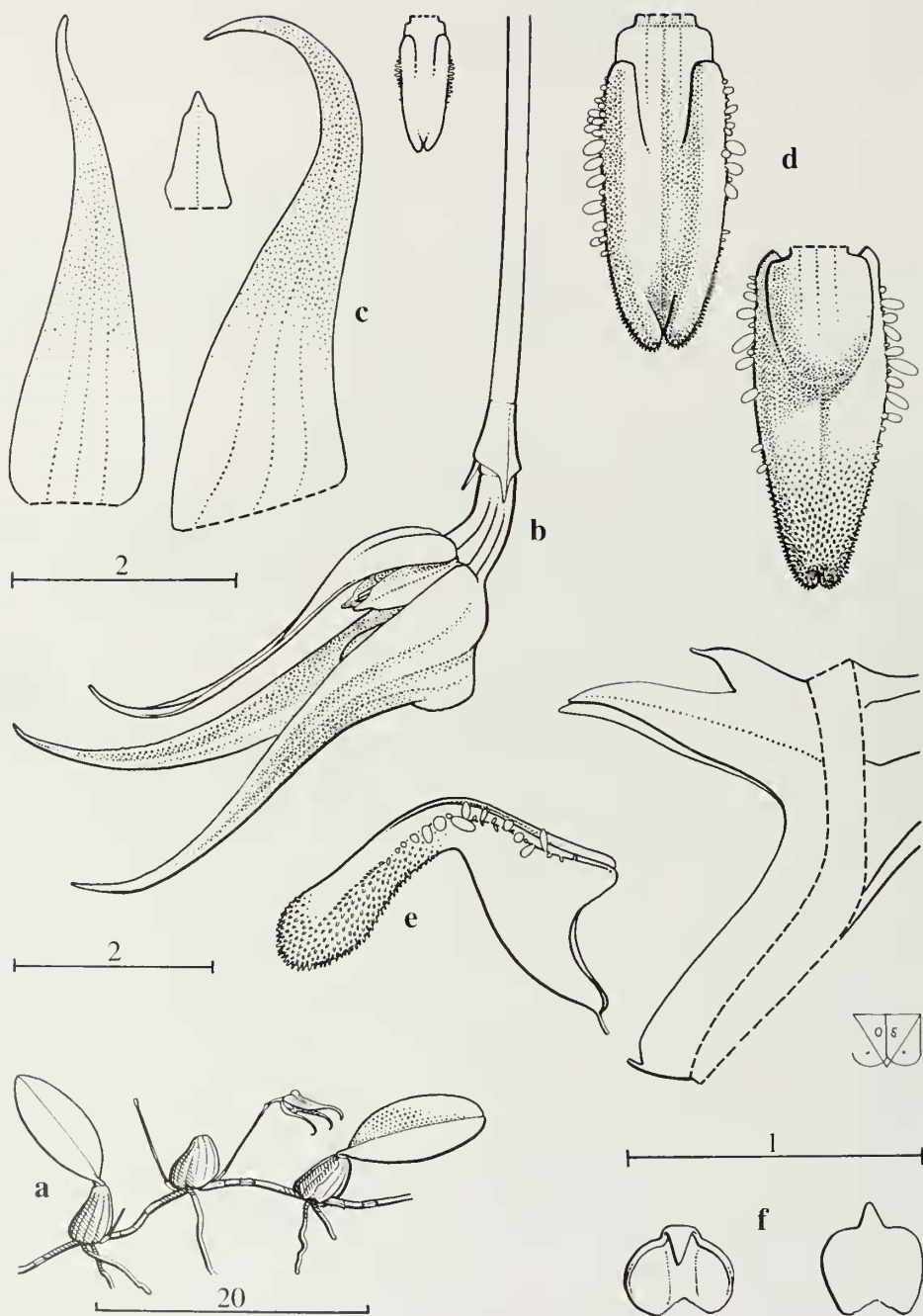


Figure 18. *Bulbophyllum ecristatum* J.J. Verm. & P. O'Byrne. A. Habit; B. Flower; C. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; D. Lip, left: adaxial side, right: abaxial side; E. Column and lip, lateral view; F. Anther, left: adaxial side, right: abaxial side. All from *SBG-O 4399* (spirit sample).

just above the ligament. Stelidia triangular, ca 0.7 mm long, acute. Anther abaxially with a slight, rounded crest, surface approx. glabrous, front margin drawn out into a triangular beak. **Pollinia** (not seen).

Colour: Sepals whitish near the base, pale purplish red around the veins, entirely pale purplish red towards the tip. Petals translucent, with a purplish red midvein. Lip purple, darker at the base.

Habitat & ecology: Found as an epiphyte in the crown of small trees in riverine forest. Alt. 1400-1500 m. Flowering Jan, Feb. Aug.

Distribution: INDONESIA. Sulawesi, central part (1 specimen seen).

Notes: *B. ciliatum* (Bl.) Lindl., is most similar, but differs in having 2.5-3 mm long, narrower petals (index 3-4), an elliptic or slightly obovate lip (without artificial spreading) and more slender, acuminate stelidia.

Bulbophyllum hemisterranthum J.J. Verm. & P. O'Byrne, *sp. nov.*

A Bulbophyllo pachyneuron foliis gradatim basin versus descrescentibus, labello glabro differt. – **Typus:** Indonesia, Sulawesi, central part, SBG-O 5046 (holo, SING). **Fig. 19.**

Roots scattered along the rhizome. **Rhizome** long creeping, 1.5-2.5 mm diam., sections between pseudobulbs 2.5-17.5 cm long, bracts not persistent. **Pseudobulbs** widely spaced, patent, ovoid-cylindrical, 2.8-5 x 0.5-0.8 cm. Petiole up to 1.2-2.5 cm long. **Leaf** blade ovate, 9-17 x 1.1-2.2 cm, index (length/width) 6-8.2; acute. **Inflorescence** 6-8.5 cm long, 1-flowered. Peduncle patent, 3.5-5 cm, bracts ca 2, the longest 4-5 mm long. Floral bract tubular, 3.5-4 mm, acute. **Flowers** not fully opening. Pedicel and ovary 18-25 mm long, basal node on a 3.5-4 mm long stump. Median **sepal** approx. porrect, ovate, ca 7 x 3.8 mm, index 1.8-1.9; apiculate-shortly acuminate, margins entire, base broadly attached; rather thick, glabrous. Lateral sepals free, recurved, oblique, ca 9 x 4 mm, index 2.2-2.3, base rather broadly attached; otherwise as the median sepal. **Petals** porrect, ovate-triangular, ca 2.8 x 1.7 mm, index 1.6-1.7; rounded and shortly apiculate, margins entire; base broadly attached; rather thin, glabrous. **Lip** recurved, general outline ovate, ca 3 x 2 mm, index ca 1.5 (all without artificial spreading), rounded, margins entire; thick; adaxially concave and furrowed over most of its length, with two rather distinct, obtuse ridges starting close to the margin and converging distally and running up to close to the tip where they meet, surface glabrous; abaxially with a weak, retuse ridge over most of its length,



Figure 19. *Bulbophyllum hemisterranthum* J.J. Verm. & P. O'Byrne. A. Habit; B. Flower; C. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; D. Lip, left: adaxial side, right: abaxial side; E. Column and lip, lateral view; F. Anther, above: adaxial side, below: abaxial side; G. Pollinia, above: a single pair, below: two pairs. All from SBG-O 5046 (spirit sample).

surface locally very finely papillose. Column ca 3.1 mm long, stigma elliptic, without keels inside, with a very slight callus at its base, column foot narrow, not thickened, without teeth. Stelidia triangular, ca 1.5 mm long, acute, upper margin slightly erose or not. Anther abaxially with a rounded crest towards the tip, surface glabrous, front margin drawn out, rounded, papillose. **Pollinia** 4, the inner as long as the outer, flattened.

Colour: Leaves green, adaxially with a thin, dull blackish purple midvein. Sepals dark red, pale green along the margins. Petals pale green with a blackish spot at the tip. Lip orange. Column pale green.

Habitat & ecology: In mossy montane forest, epiphyte in thick moss pads on trees bordering a stream, also terrestrial in mossy riverbank. Alt. ca 1200–1400 m. Flowering Feb.

Distribution: INDONESIA. Sulawesi, central part (1 specimen seen).

Notes: This is best placed in sect. *Monanthoparva* because of its general habit, the narrow column foot, combined with the somewhat fleshy, at least not diaphanous flowers. Among the Sulawesi species, it is most similar to *B. pachyneuron* Schltr., which differs in having wider leaves that are abruptly narrowed at their base, and a partly papillose lip.

***Bulbophyllum* sect. *Monanthes* (Bl.) Aver.**
(= sect. *Polyblepharon*)

Diphyes sect. *Monanthes* Bl., Bijdr. Fl. Ned. Ind. (1825) 311. – *Bulbophyllum* sect. *Monanthes* (Bl.) Aver., Identification Guide to Vietnamese Orchids (1994) 279. – TYPE SPECIES: *Diphyes tortuosa* Bl. [= *Bulbophyllum tortuosum* (Bl.) Lindl.].

Bulbophyllum sect. *Polyblepharon* Schltr., Feddes Repert. 10 (1912) 177; Feddes Repert. Beih. 1 (1913) 701, 794; Van Royen, Alpine Fl. New Guinea 2 (1979) 217. – LECTOTYPE SPECIES (designated by Van Royen): *Bulbophyllum polyblepharon* Schltr.

***Bulbophyllum consimile* J.J. Verm. & P. O'Byrne, sp. nov.**

A *Bulbophyllo* membranaceo *sepali mediani marginibus papilloso-ciliolatis, labello pagina adaxiali sine crista mediana, stelidiorum secus margines inferiores sine dente deltoideo differt differt.* – **Typus:** Indonesia, Sulawesi, southwest part SBG-O 5006 (holo. SING). **Fig. 20.**

Roots below the pseudobulbs, spreading. **Rhizome** creeping or shortly straggling, 1.5–2 mm diam., sections between pseudobulbs 4–5 cm long, bracts not persistent. **Pseudobulbs** ovoid, (obliquely) erect, 1.4–1.5 x 0.6–0.8 cm. Petiole up to 2.5–4 mm long. **Leaf** blade ovate, 3.6–4 x 2.1–2.2 cm, index (length/width) 1.7–1.8; acute. **Inflorescence** ca 1.4 cm long, 1-flowered. Peduncle porrect, ca 0.6–0.9 cm, bracts 2.5–4 mm long. Floral bracts tubular, 1.8–2.5 mm, acute. **Flowers** not fully opening. Pedicel and ovary ca 2 mm long, basal node coinciding with the attachment of the floral bract. Median **sepal** slightly recurved, elliptic, ca 5.2 x 2.7 mm, index 1.9–2; acute-acuminate, margins entire, finely papillose-ciliolate, base widely attached; rather thick, surface glabrous. Lateral sepals approx. porrect, fused along the lower margin, oblique, triangular, ca 6 x 2.4 mm, index ca 2.5; acute; margins entire; glabrous; otherwise as the median sepal. **Petals** porrect, ovate-triangular, ca 2.1 x 1.3 mm, index ca 1.6; acuminate, margins finely erose, base widely attached; thin, surface glabrous. **Lip** recurved about half-way, general outline ovate, ca 2.3 x 1.1 mm, index ca 2.1; acute-apiculate, margins ciliate in the top $\frac{2}{3}$ of its length; rather thick over its entire length, surface glabrous; adaxially slightly concave towards the base, slightly convex towards the tip, without a median ridge; abaxially virtually without a ridge near the base. Column ca 1.4 mm long, stigma without basal tooth, column foot thickened near the tip. Stelidia curved, triangular, ca 0.7 mm long, acute. Anther abaxially with a slight, rounded, papillose crest, surface somewhat papillose, front margin drawn out into a deltoid beak with approx. glabrous margins. **Pollinia** 4, drop-shaped, the inner somewhat flattened and about half as long as the outer, a fleshy stipes is present.

Colours: Median sepal and petals dull purple. Lateral sepals idem, but pale yellow along lower margin. Lip purple.

Habitat & ecology: Understory epiphyte in moss cushions in low, dense, very wet montane forest, also in trees in gardens, at 1600–2200 m alt. Flowering Jan.

Distribution: INDONESIA. Sulawesi: Sulawesi, southwest part (1 specimen seen).

Notes: *B. consimile* is very similar to the widespread *B. membranaceum* Teysm. & Binnend., at first sight, but differs in details of the flowers: the basal node of the pedicel is level with the attachment of the floral bract, the median sepal has papillose-ciliolate margins (not glabrous), the lip margins are ciliate (not papillose), the lip is about equally thick (in lateral view) over most of its

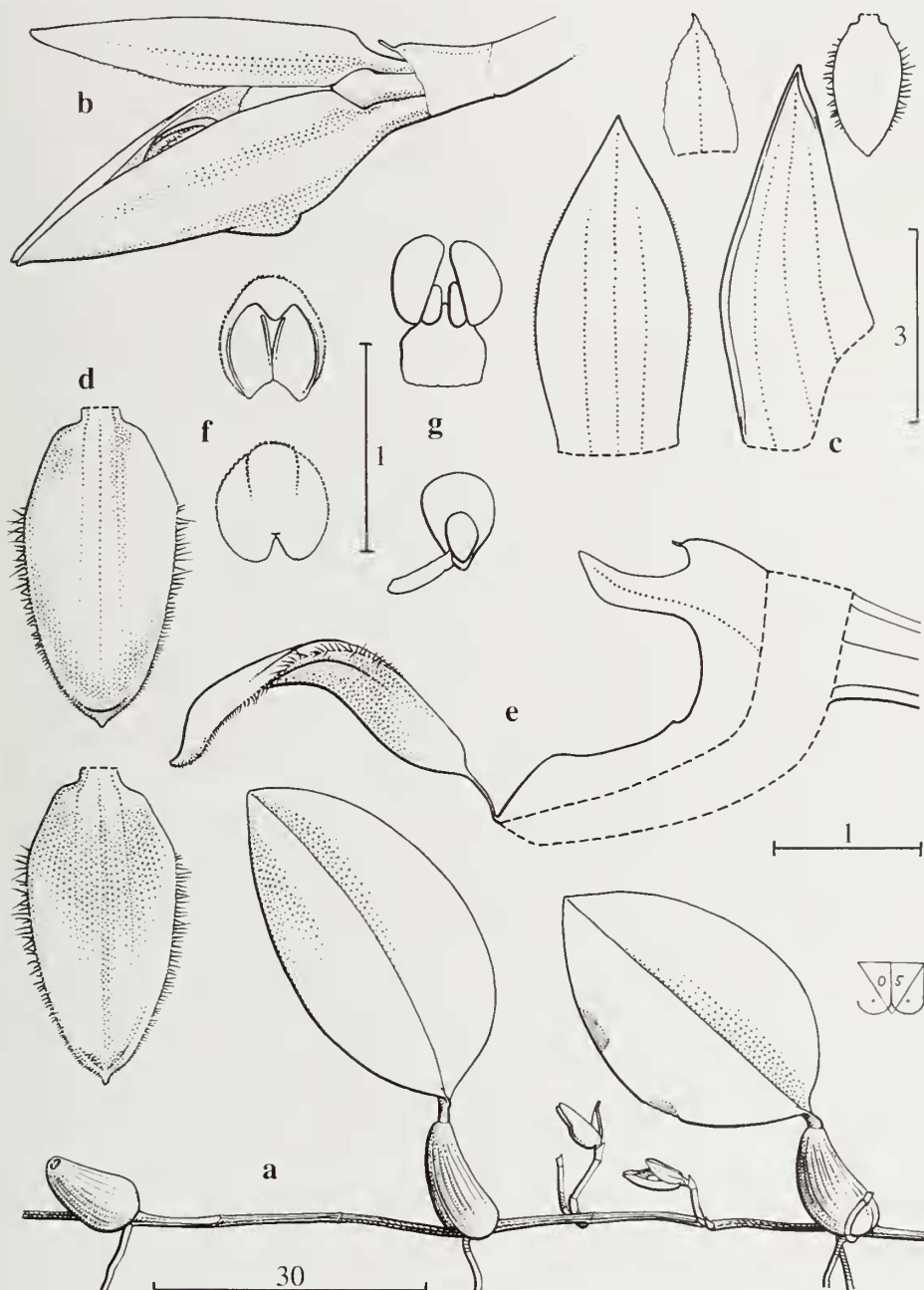


Figure 20. *Bulbophyllum consimile* J.J. Verm. & P. O'Byrne. A. Habit; B. Flower; C. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; D. Lip, left: adaxial side, right: abaxial side; E. Column and lip, lateral view; F. Anther, above: adaxial side, below: abaxial side; G. Pollinia, above: two pairs with appendage, below: a single pair. All from SBG-O 5006 (spirit sample).

length (not distinctly thicker near the base), and lacks a median ridge, and the stelidia lack a deltoid tooth along the lower margins.

Bulbophyllum oncopus J.J. Verm. & P. O'Byrne, *sp. nov.*

A *Bulbophyllo oligochaete sepalis ciliatis, lateralibus obtusis, petalis triangularibus obtusis, stelidiis secus marginem inferiorem sine dente differt.* – **Typus:** Indonesia, Sulawesi, SBG-O 3947 (holo, SING). **Fig. 21.**

Roots all produced close to the base of the rhizome. **Rhizome** hanging down perpendicularly, up to 10 cm long, ca 1 mm diam., bracts not persistent. **Pseudobulbs** ovoid-cylindrical, prostrate on and fused to the rhizome, so that the new pseudobulbs arise from half-way the length of the old, 0.6-1.2 x 0.15-0.25 cm. Petiole up to 1 mm long. **Leaf** blade ovate, 2.7-4.8 x 0.5-1.1 cm, index (length/width) 4.3-7; acute. **Inflorescence** ca 0.8 cm long, 1-flowered. Peduncle porrect, ca 0.15-0.2 cm, bracts 1. 2-2.5 mm long. Floral bracts tubular, ca 2.5 mm, acute. **Flowers** not fully opening. Pedicel and ovary ca 1.3 mm long, basal node coinciding with the attachment of the floral bract. Median **sepal** recurved, elliptic, ca 3.3 x 1.8 mm, index 1.8-1.9; rounded, margins entire, ciliate, base widely attached; rather thick, surface glabrous. Lateral sepals porrect, fused along the lower margin up to $\frac{2}{3}$ of their length, oblique, ca 4 x 1.3 mm, index 3-3.1; obtuse; upper margin ciliate-fimbriate; otherwise as the median sepal. **Petals** porrect, ovate, ca 0.8 x 0.7 mm, index 1.1-1.2; obtuse, margins slightly erose towards the tip, base widely attached; rather thin, glabrous. **Lip** almost straight, general outline ovate with a drawn out, narrow top half because the margins are folded backwards, ca 1.7 x 0.7 mm, index 2.4-2.5; obtuse, margins ciliate in the basal half, papillose in the top half; thin, surface glabrous; adaxially slightly concave towards the base, as well as near the tip, without a median ridge; abaxially without a ridge near the base. Column ca 1.2 mm long, stigma without basal tooth, column foot distinctly widened and thickened and with a flat somewhat angular swelling near each margin. Stelidia curved, triangular, ca 0.6 mm long, acute. Anther abaxially with a distinct, rounded, papillose crest, surface somewhat papillose, front margin drawn out into a rounded beak with approx. glabrous margins. **Pollinia** 4, drop-shaped, the inner flattened and less than half as long as the outer.

Colours: Median sepal pinkish purple, whitish towards the base, with slighty darker veins. Lateral sepals pinkish purple, with a white patch near the base. Petals translucent white. Lip pinkish purple, but white along the midvein. Column white.

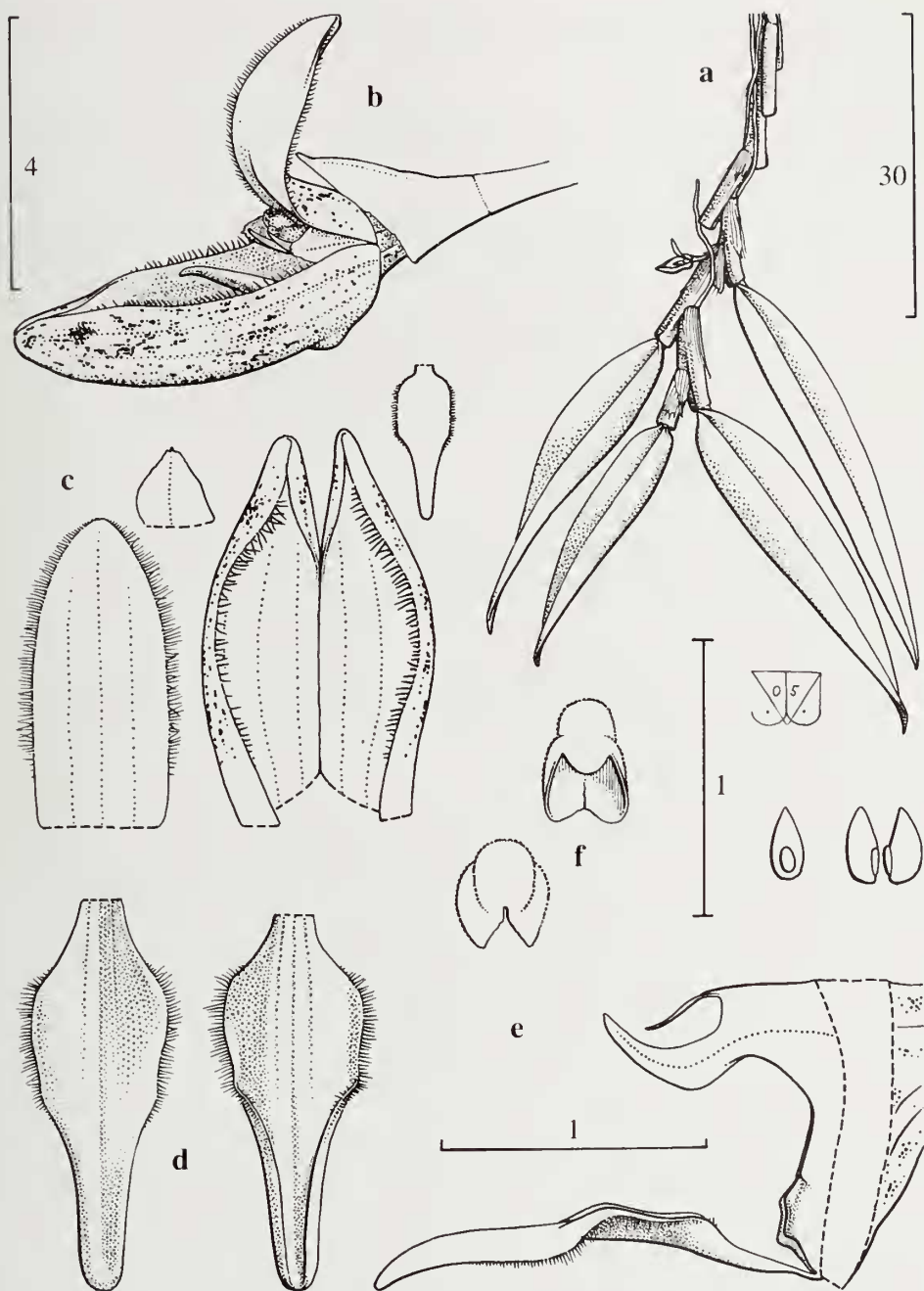


Figure 21. *Bulbophyllum oncopus* J.J. Verm. & P. O'Byrne. A. Habit; B. Flower; C. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; D. Lip, left: adaxial side, right: abaxial side; E. Column and lip, lateral view; F. Anther, above: abaxial side, below: adaxial side; G. Pollinia, left: one pair, right: two pairs. All from SBG-O 3947 (spirit sample).

Habitat & ecology: Montane forest on limestone soil, at 1500 m alt. Flowering Jan-Mar, Oct-Dec.

Distribution: INDONESIA. Sulawesi: Sulawesi, central part (1 specimen seen).

Notes: *B. oncopus* shares the general shape of the lip, with recurved margins in the top half, with *B. oligochaete* Schltr. from New Guinea. It differs in having ciliate sepals, the lateral sepals obtuse rather than broadly round, triangular, obtuse petals and stelidia without a tooth along the lower margin. *B. loxophyllum* Schltr. also from New Guinea is even more similar in the shape of the flower parts, but has eciliate lateral sepals and the margins of the lip not recurved.

***Bulbophyllum* sect. *Polymeres* (Bl.) J.J. Verm. & P. O'Byrne, comb. nov.**
(= sect. *Fruticicola*, sect. *Epibulbon*, sect. *Leptopus*, sect. *Megaloglossum*, sect. *Rhizocaulon*)

Diphyes sect. *Polymeres* Bl., Bijdr. Fl. Ned. Ind. 7 (1825) 318. – LECTOTYPE SPECIES (here designated): *Diphyes tenuifolia* Bl. [*Bulbophyllum tenuifolium* (Bl.) Lindl.].

Bulbophyllum sect. *Microunanthe* Schltr., Feddes Repert. Beih. 1 (1913) 701 & 783. – *Bulbophyllum* sect. *Schlechteria* Van Royen, Alpine Fl. New Guinea 2 (1979) 207. – LECTOTYPE SPECIES (designated by Van Royen): *Bulbophyllum neoguineense* J.J. Sm.

Bulbophyllum sect. *Leptopus* Schltr., Feddes Repert. Beih. 1 (1913) 702 & 828; Van Royen, Alpine Fl. New Guinea 2 (1979) 223. – LECTOTYPE SPECIES (designated by Van Royen): *Bulbophyllum leptopus* Schltr.

Bulbophyllum sect. *Rhizocaulon* Schltr., Feddes Repert. Beih. 1 (1913) 702 & 831. – LECTOTYPE SPECIES (here designated): *Bulbophyllum dictyoneuron* Schltr.

Bulbophyllum sect. *Fruticicola* Schltr., Feddes Repert. Beih. 1 (1913) 702 & 833; Van Royen, Alpine Fl. New Guinea 2 (1979) 227. – LECTOTYPE SPECIES (designated by Van Royen): *Bulbophyllum fruticicola* Schltr.

Bulbophyllum sect. *Epibulbon* Schltr., Feddes Repert. Beih. 1 (1913) 703 & 845. – LECTOTYPE SPECIES (here designated): *Bulbophyllum epibulbon* Schltr.

Bulbophyllum sect. *Megaloglossum* Carr. J. Malayan Branch Roy. Asiat. Soc. 11. 1 (1933) 90. – TYPE SPECIES: *Bulbophyllum brastagiense* Carr (= *B. crepidiferum* J.J. Sm.).

This section includes a large number of species, all characterized by the presence of lateral teeth or wings on the column foot, next to the ligament. Additional characters present in many species include: flowers fairly small (1 cm long or less) sepals and petals thin, petals much shorter than the sepals, lip thick and spongy, with a tuft of hairs or papillae on the abaxial side, column with distinct, acute stelidia, column foot elongated.

Vegetatively, the species display a wide array of growth forms, which have been used in the past to arrange the species into sections: long, thin, creeping rhizomes with widely spaced, erect pseudobulbs (section *Megaloglossum*), patent or pendulous rhizomes with slender porrect pseudobulbs (section *Leptopus*), patent or pendulous rhizomes with short, porrect, distichous pseudobulbs (section *Fruticicola*), patent or pendulous rhizomes with the pseudobulbs fused to it, one placed on top of the other (section *Epibulbon*). It is difficult, however, to uphold these groupings: too many species appear intermediate between groups. The new Sulawesi species here described include several examples of such intermediates. Provisionally, we prefer to include them all in one section. The grouping given below is to fit Sulawesi material only and has no practical value outside the area.

Group a - Species with creeping rhizomes, more or less distant pseudobulbs of substantial size, and inflorescences much shorter than the pseudobulb plus leaf they arise from.

The flowers are often as in section *Fruticicola*, a section generally characterized by a patent or pendulous rhizome. *Bulbophyllum valeryi* J.J. Verm. & P. O'Byrne from Sulawesi belongs here too.

Bulbophyllum cymbochilum J.J. Verm. & P. O'Byrne, sp. nov.

Bulbophyllum cymbochilum J.J. Verm. & P. O'Byrne, in sectione *Polymeres* labellum concavum leviter sursum flexum singularis. – **Typus**: Indonesia, Sulawesi, central part, SBG-O 5239 (holo, SING). **Fig. 22.**

Roots mainly below the pseudobulbs. **Rhizome** creeping, 1.2-1.8 mm diam., sections between pseudobulbs 0.5-0.8 cm long, bracts not persistent. **Pseudobulbs** spaced, obliquely erect, ovoid, 0.7-0.9 x 0.4-0.5 cm. Petiole up to 0.3 cm long. **Leaf** blade elliptic to ovate, 2.2-2.8 x 0.7-0.9 cm, index (length/width) 2.3-3.3; acute. **Inflorescence** ca 0.9 cm long, 1-flowered. Peduncle patent, 0.18-0.25 cm, bracts ca 2, the longest ca 1.4 mm long. Floral



Figure 22. *Bulbophyllum cymbochilum* J.J. Verm. & P. O'Byrne. A. Habit; B. Flower; C. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; D. Lip, left: adaxial side, right: abaxial side; E. Column and lip, lateral view; F. Anther, left: abaxial side, right: adaxial side. All from SBG-O 5239 (spirit sample).

bract tubular, ca 1.7 mm, acute. **Flowers** opening wide. Pedicel and ovary ca 2.2 mm long, basal node on a ca 0.8 mm long stump. Median **sepal** spreading, elliptic, ca 5.8 x 2.2 mm, index 2.6-2.7; acuminate, margins entire, slightly papillose distally, base rather narrowly attached; rather thin, surface glabrous. Lateral sepals free, spreading to reflexed, oblique, ca 6 x 2.5 mm, index ca 2.4; otherwise as the median sepal. **Petals** porrect, elliptic, ca 2.1 x 1.8 mm, index 1.1-1.2; rounded, margins slightly erose and very finely papillose; base shortly clawed; thin, adaxially slightly and very finely papillose towards the tip. **Lip** approx. straight or slightly incurved at the tip, general outline approx. elliptic, ca 2.9 x 1.3 mm, index 2.2-2.3 (all without artificial spreading), rounded, margins entire slightly papillose towards the base; very thick and soft, surface slightly papillose locally; adaxially entirely concave, with two rounded ridges starting at the base, near the margin, gradually converging up to about 2/5 of the length of the lip, in between these ridges, near the base of the lip, a transverse ridge consisting of two fused teeth, leaving a small cavity in between on their front side; abaxially with a wide, retuse ridge over most of the length of the lip. Column ca 1 mm long, stigma elliptic, without keels inside, without teeth at its base, column foot with thin, ovate, obtuse lateral teeth just above the ligament. Stelidia triangular, ca 0.4 mm long, acute. Anther abaxially with a rounded crest, surface approx. glabrous, front margin drawn out, rounded, papillose. **Pollinia** (not seen).

Colour: Plant green. Sepals cream coloured with purplish red veins and stains. Petal translucent white with large blackish blotches. Lip dark purplish red, white near the base.

Habitat & ecology: Found as an understory epiphyte in mossy montane forest. Alt. ca 1200-1400 m. Flowering Feb-Apr, Jun-Aug, Nov.

Distribution: INDONESIA: Sulawesi, central part (1 specimen seen).

Notes: Uniquely identified within section *Polymeres* by its concave, slightly upturned lip.

Bulbophyllum gamandrum J.J. Verm. & P. O'Byrne, *sp. nov.*

A *Bulbophyllo* bowkettiae *labello ovato, stelidiis rectis, et a* *B. sarcochilum* *sepalis longioribus, labello ad basin plus distincte concavo differt.* – **Typus:** Indonesia, Sulawesi, central part, SBG-O 5112 (holo, SING). **Fig. 23.**

Roots scattered along the rhizome. **Rhizome** creeping, 1.5-2 mm diam., sections between pseudobulbs 1.2-1.3 cm long, bracts not persistent.

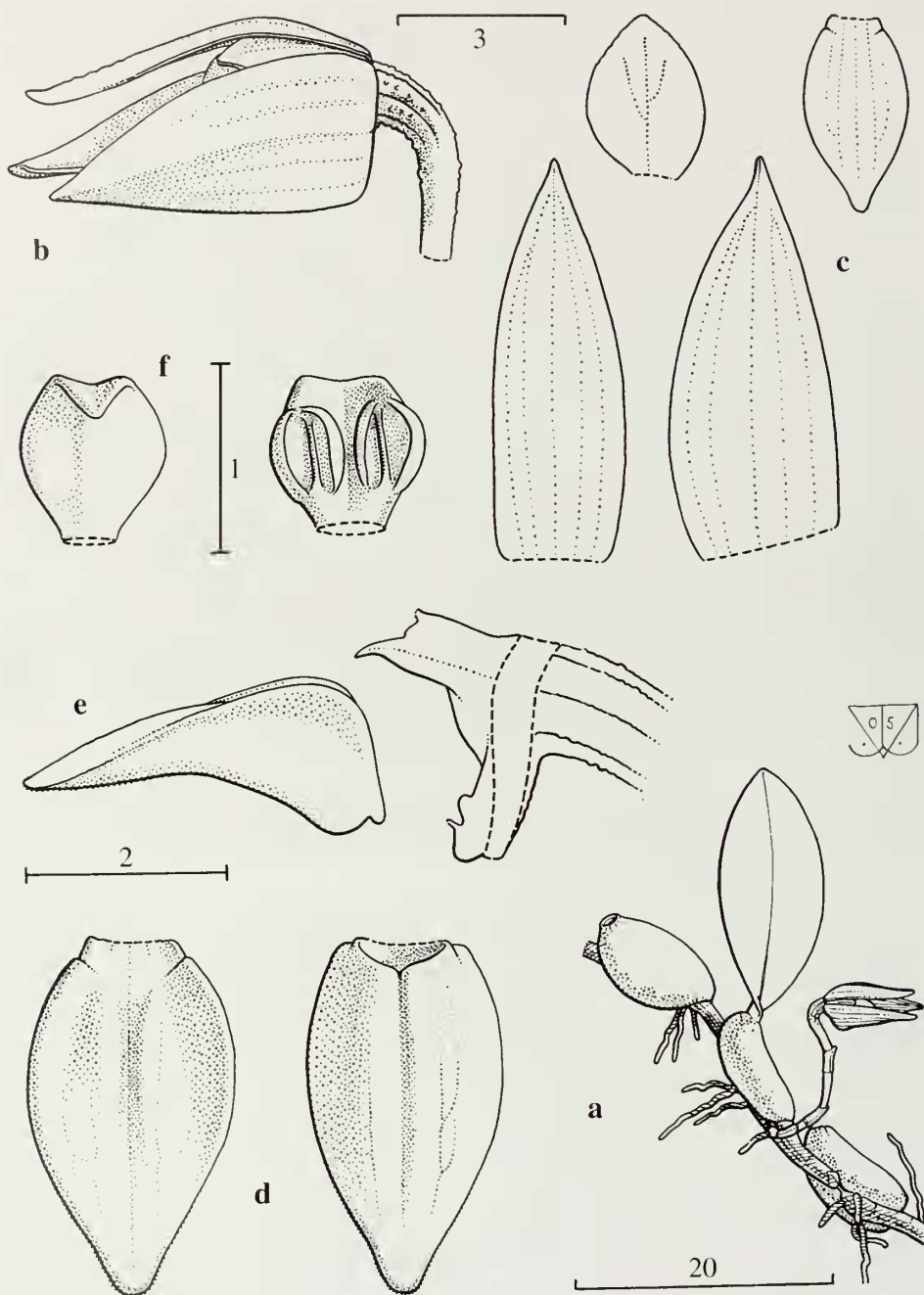


Figure 23. *Bulbophyllum gamandrum* J.J. Verm. & P. O'Byrne. A. Habit; B. Flower; C. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; D. Lip, left: adaxial side, right: abaxial side; E. Column and lip, lateral view; F. Anther, left: abaxial side, right: adaxial side. All from SBG-O 5112 (spirit sample).

Pseudobulbs spaced, prostrate for most of their length, ovoid, 0.9-1 x ca 0.6 cm. Petiole up to 0.15 cm long. **Leaf** blade elliptic, ca 1.9 x 0.9 cm, index (length/width) ca 2.1; obtuse. **Inflorescence** ca 1.9 cm long, 1-flowered. Peduncle patent, ca 0.9 cm, bracts ca 4, the longest ca 2.8 mm long. Floral bract tubular, ca 2.5 mm, acute. **Flowers** not fully opening. Pedicel and ovary ca 6 mm long, the latter slightly costulate, basal node on a ca 2 mm long stump. Median **sepal** approx. porrect, ovate, ca 7 x 2.5 mm, index ca 2.8; acute, margins entire, base broadly attached; rather thin, glabrous. Lateral sepals free, recurved, oblique, ca 7.3 x 3 mm, index 2.4-2.5; otherwise as the median sepal. **Petals** porrect, elliptic, ca 2.8 x 2 mm, index ca 1.4; obtuse, margins slightly erose; base narrowly attached; thin, surface approx. glabrous. **Lip** slightly curved, general outline approx. ovate with a slightly drawn-out top part, ca 3.5 x 2.3 mm, index 1.5-1.6 (all without artificial spreading), obtuse, margins entire; thick, glabrous but slightly and finely papillose near the tip; adaxially concave and slightly furrowed in the basal half, surface slightly convex near the tip; abaxially with a weak, retuse ridge up to about half-way its length. Column ca 1.5 mm long, stigma approx. circular, without keels inside, with a distinct callus at its base, column foot widened and thickened, with thick, retrorse, semi-elliptic, obtuse lateral teeth just above the ligament. Stelidia triangular, ca 0.7 mm long, acute. Anther fused to the top of the column, abaxially with a inconspicuous crest, surface approx. glabrous, front margin drawn out, obtuse. **Pollinia** (not seen).

Colour: Plant green. Sepals pale reddish with darker veins. Lip purplish red.

Habitat & ecology: Epiphyte in open, low, secondary woodland of thin pole trees on a steep slope. Alt. 800-1000 m. Flowering Feb, Apr.

Distribution: INDONESIA. Sulawesi, central part (1 specimen seen).

Notes: *B. bowkettiae* F.M. Bail., from Australia, is most similar, but has an oblong lip and upturned stelidia. *B. sarcochilum* J.J. Verm. & P. O'Byrne, is vegetatively similar but has much shorter sepals and a lip that is concave only near the base.

Bulbophyllum rhodophyllum J.J. Verm. & P. O'Byrne, *sp. nov.*

A *Bulbophyllo* ciliipetalo foliis minoribus (versus circa 10 cm longa), inflorescentia brevior (versus 3 cm longa), labello obtuso sepalis brevior, a *B. ruguloso petalis acutis* differt. – **Typus:** Indonesia, Sulawesi, central part, SBG-O 5066 (holo, SING). **Fig. 24.**

Roots below the pseudobulbs. **Rhizome** creeping, 1.2-1.5 mm diam., sections between pseudobulbs 0.7-1.5 cm long, bracts not persistent. **Pseudobulbs** spaced, prostrate towards the base, ovoid, 0.6-1.2 x 0.4-0.7 cm. Petiole up to 0.3 cm long. **Leaf** blade elliptic to ovate, 1.3-2.8 x 0.5-0.8 cm, index (length/width) 2.6-3.6; acute. **Inflorescence** ca 1.7 cm long, 1-flowered. Peduncle patent, ca 0.25 cm, bracts ca 2, the longest ca 1 mm long. Floral bract tubular, ca 2.5 mm, acute. **Flowers** opening wide. Pedicel and ovary ca 6 mm long, costulate, basal node on a ca 1.5 mm long stump. Median **sepal** spreading, elliptic, ca 9 x 2.2 mm, index ca 4.1; acute, margins entire, base rather broadly attached; rather thin, surface glabrous. Lateral sepals free, oblique, ovate, ca 9 x 3.2 mm, index ca 2.8; otherwise as the median sepal. **Petals** porrect, elliptic, ca 3 x 1 mm, index ca 3; acute, margins entire, papillose with elongated papillae; base rather broadly attached; rather thin, adaxially very finely papillose towards the margins. **Lip** slightly recurved near the base, general outline ovate, ca 5 x 1.4 mm, index 3.5-3.6 (all without artificial spreading), obtuse, margins entire, slightly papillose towards the base; thick and soft, surface slightly verrucate distally; adaxially concave and somewhat furrowed towards the base, slightly convex towards the tip; abaxially with an inconspicuous ridge near the base, surface with a papillose-shortly hairy patch in the basal half of the lip. Column ca 1.5 mm long, stigma obovate, without keels inside, without teeth at its base, column foot widened and thickened, with thick, triangular, obtuse lateral teeth just above the ligament. Stelidia triangular, ca 0.5 mm long, acute. Anther abaxially with a rounded crest, surface papillose, front margin drawn out, rounded, papillose. **Pollinia** 4, ovoid, the inner almost as long as the outer, flattened.

Colour: Pseudobulbs purplish, leaves dark green. Sepals pale ochrish with purplish red veins. Petals whitish with hyaline papillae along the margins. Lip purplish red near base, orange red towards the tip.

Habitat & ecology: Found as an understory epiphyte in mossy montane forest. Alt. ca 1200-1400 m. Flowering Feb, Apr-Aug, Nov, Dec.

Distribution: INDONESIA. Sulawesi, central part (1 specimen seen).

Notes: Most similar to *B. ciliipetalum* Schltr., which differs in having larger leaves (about 10 cm long), a longer inflorescence (about 3 cm long), and an acute lip which is almost as long as the sepals. *B. rugulosum* J.J. Sm., differs in being a larger plant, and in having rounded petals.

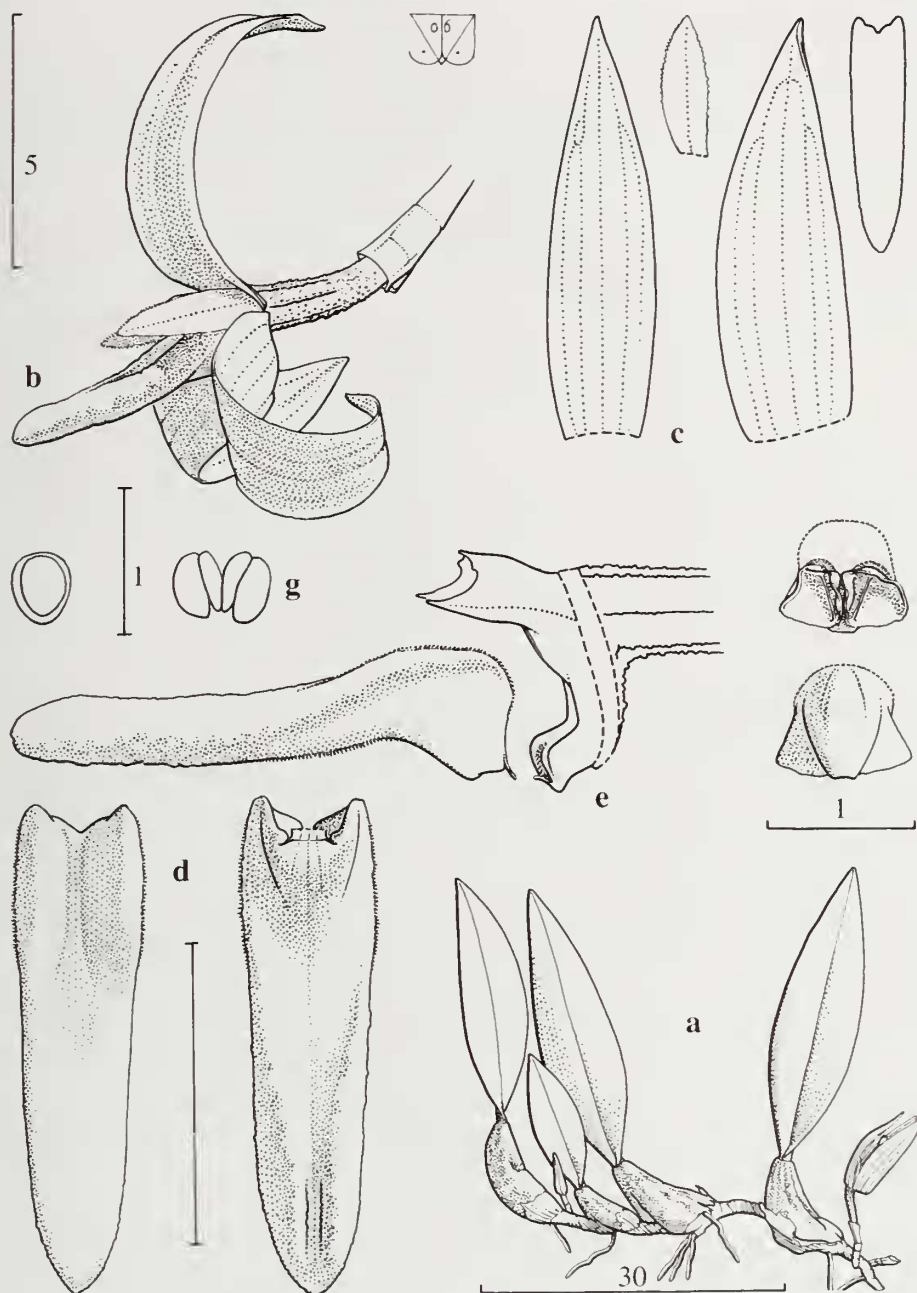


Figure 24. *Bulbophyllum rhodophyllum* J.J. Verm. & P. O'Byrne. A. Habit; B. Flower; C. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; D. Lip, left: adaxial side, right: abaxial side; E. Column and lip, lateral view; F. Anther, above: adaxial side, below: abaxial side; G. Pollinia, left: a single pair, right: two pairs. All from SBG-O 5066 (spirit sample).

Bulbophyllum sarcochilum J.J. Verm. & P. O'Byrne, *sp. nov.*

A Bulbophyllis bowkettiae et B. johnsonii sepalis brevioribus et latioribus (indice 2—3 in speciebus ambabus australiis), labello plus carnosio ad basin leviter concavo tantum differt. — **Typus:** Indonesia, Sulawesi, central part, SBG-O 5783 (holo, SING). **Fig. 25.**

Roots scattered along the rhizome. **Rhizome** creeping, ca 1.5 mm diam., sections between pseudobulbs 1.5–2 cm long, bracts not persistent. **Pseudobulbs** spaced, prostrate towards the base, ellipsoid to obovoid, 1.1–1.2 x ca 0.6 cm. Petiole up to 0.05 cm long. **Leaf** blade ovate to elliptic, ca 1.7 x 0.8–0.9 cm, index (length/width) 1.9–2.1; obtuse. **Inflorescence** ca 1.6 cm long, 1-flowered. Peduncle patent, ca 0.9 cm, bracts ca 3, the longest ca 2 mm long. Floral bract tubular, ca 2.5 mm, acute. **Flowers** not fully opening. Pedicel and ovary ca 4.5 mm long, the latter slightly costulate, basal node on a ca 2 mm long stump. Median **sepal** approx. porrect, ovate, ca 3.2 x 2 mm, index ca 1.6; shortly acuminate, margins finely papillose towards the tip, base broadly attached; rather thick, surface glabrous. Lateral sepals free, recurved, oblique, ca 3.5 x 2.3 mm, index 1.5–1.6, upper margin glabrous; otherwise as the median sepal. **Petals** porrect, elliptic-ovate, ca 2 x 1.3 mm, index 1.5–1.6; rounded, margins finely papillose-ciliolate; base narrowly attached; thin, surface approx. glabrous. **Lip** approx. straight, general outline approx. elliptic, ca 2.2 x 1.2 mm, index 1.8–1.9 (all without artificial spreading), rounded, margins entire; thick and soft; adaxially slightly concave and furrowed near the base, with two low, obtuse ridges starting close to the margin and converging distally and running up to $\frac{2}{5}$ – $\frac{1}{2}$ of the length of the lip, surface convex distally, adaxial surface glabrous; abaxially with a weak, retuse ridge and a papillose surface near the base. Column ca 1.4 mm long, stigma circular, without keels inside, with a slight callus at its base, column foot widened and thickened, with thick, deltoid, obtuse lateral teeth just above the ligament. Stelidia triangular, ca 0.7 mm long, acute. Anther abaxially with a rounded crest, surface approx. glabrous but papillose towards the tip, front margin drawn out, rounded, papillose. **Pollinia** 4, the inner slightly shorter than the outer, flattened.

Colour: Sepals yellow, with slightly darker veins. Petals translucent yellow, with a blackish red midvein and top. Lip bright yellow, suffused with red near the base.

Habitat & ecology: Epiphyte in montane oak forest. Alt. ca 1200 m. Flowering Apr.

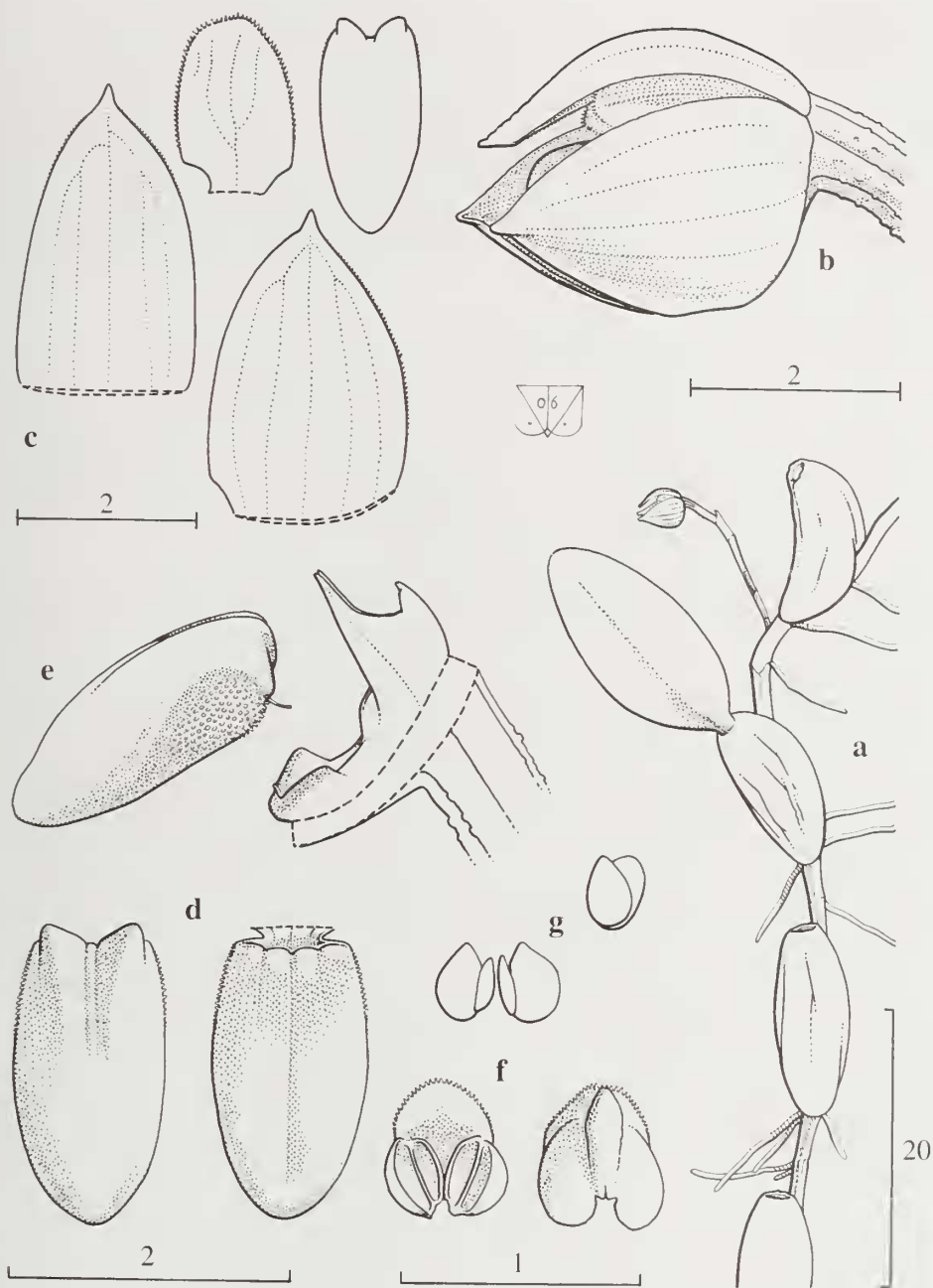


Figure 25. *Bulbophyllum sarcocochilum* J.J. Verm. & P. O'Byrne. A. Habit; B. Flower; C. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; D. Lip, left: adaxial side, right: abaxial side; E. Column and lip, lateral view; F. Anther, left: adaxial side, right: abaxial side; G. Pollinia, left: two pairs, right: a single pair. All from SBG-O 5783 (spirit sample).

Distribution: INDONESIA. Sulawesi, central part (1 specimen seen).

Notes: Vegetatively, this species looks similar to *B. bowkettiae* F.M. Bail., and, to a lesser extent, *B. johnsonii* T.E. Hunt, both from Australia. It shares the half-prostrate pseudobulbs on a long-creeping rhizome with both species; it differs in having shorter and wider sepals (index 2-3 in both Australian species). Also, the lip is much more fleshy, and only slightly concave near the base.

Bulbophyllum semiindutum J.J. Verm. & P. O'Byrne, *sp. nov.*

A *Bulbophyllo* *valeryi* *petalis subacutis, stigmatidis basin sine dentibus, a* *B. caeco* *et* *B. pisibulbo* *sepalis latioribus (indice plus quam 2 in B. pisibulbo), pedicellis brevioribus (pedicellum ovariumque plus quam 12 mm longum) differt.* – **Typus:** Indonesia, Sulawesi, central part, SBG-O 5051 (holo, SING). **Fig. 26.**

Roots below the pseudobulbs. **Rhizome** creeping, 1.2-1.5 mm diam., sections between pseudobulbs 0.5-0.8 cm long, bracts not persistent. **Pseudobulbs** spaced, obliquely erect, ovoid, 0.6-1 x 0.3-0.5 cm. Petiole up to 0.2 cm long. **Leaf** blade elliptic, 1.7-2.7 x 0.4-0.5 cm, index (length/width) 4.2-5.4; acute. **Inflorescence** ca 1 cm long, 1-flowered. Peduncle patent, 0.3-0.4 cm, bracts ca 2, the longest ca 1.5 mm long. **Floral** bract tubular, ca 1.8 mm, acute. **Flowers** opening wide. Pedicel and ovary ca 3.7 mm long, costulate, basal node on a ca 1.5 mm long stump. Median **sepal** recurved, ovate, ca 4.3 x 2.3 mm, index 1.8-1.9; acute, margins entire, base rather broadly attached; rather thin, adaxial surface slightly fine papillose locally. Lateral sepals free, spreading, oblique, ovate-triangular, ca 4.2 x 3 mm, index ca 1.4; otherwise as the median sepal. **Petals** porrect, elliptic-obovate, ca 2.3 x 1.4 mm, index 1.6-1.7; subacute, margins entire, papillose; base narrowly attached; thin, approx. glabrous. **Lip** recurved, general outline elliptic, ca 2.5 x 1.2 mm, index ca 2.1 (all without artificial spreading), round, margins entire; thick and soft; adaxially with a wide, deep cavity near the base, this separate from the concave and somewhat furrowed middle part of the lip which is bordered by two rounded ridges situated close to the margin and converging distally and running up to 3/5 of the length of the lip, surface convex distally, entire adaxial surface glabrous except for papillose patches close to the margins about halfway along the length of the lip; abaxially with a retuse ridge up to 3/4 of the length of the lip, surface papillose except near the tip and near the base. Column ca 1.3 mm long, stigma circular, without keels inside, without teeth at its base, column foot widened and thickened, with thick, triangular, obtuse lateral teeth just above the ligament. Stelidia triangular, ca 0.4 mm long,

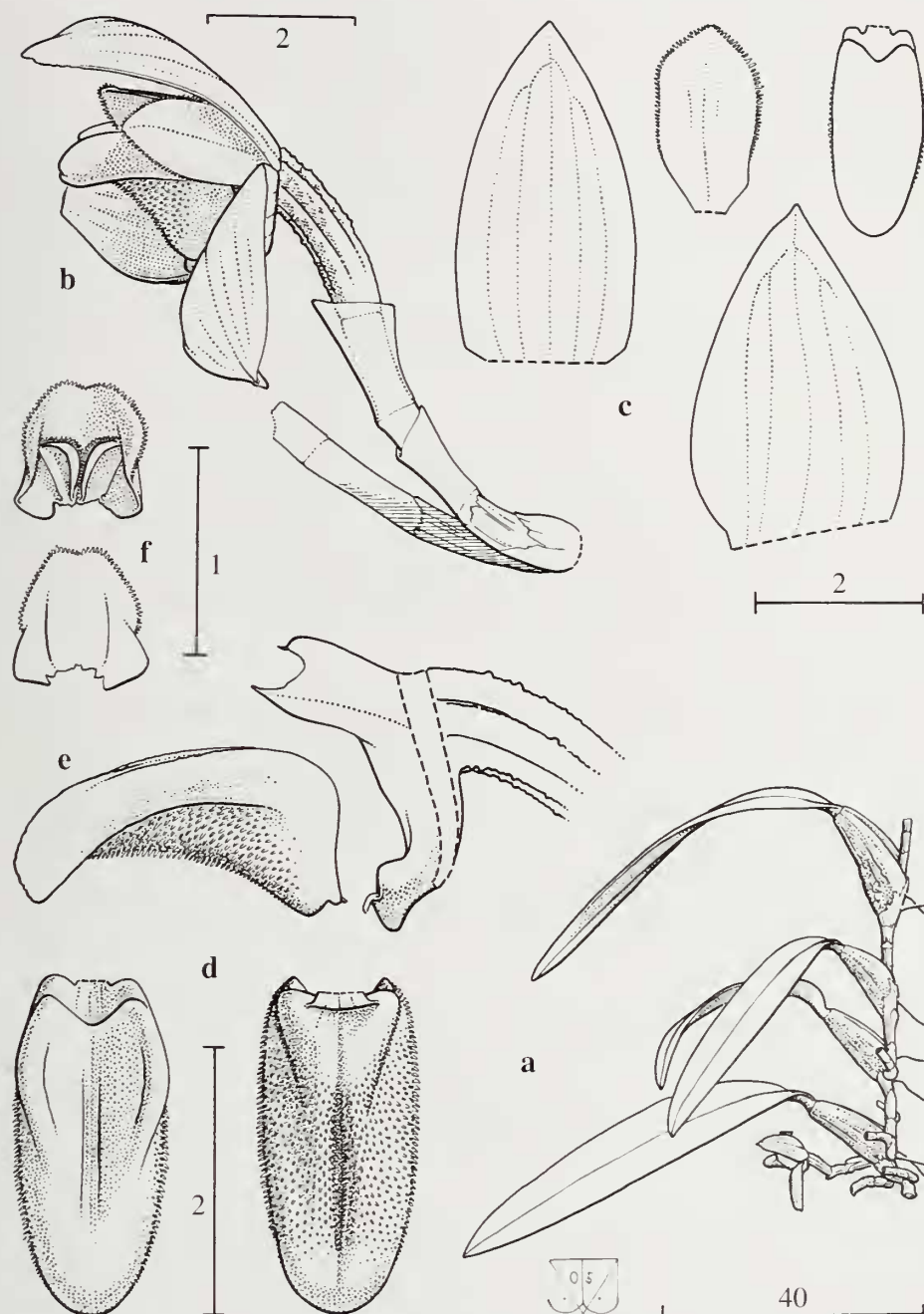


Figure 26. *Bulbophyllum semiindutum* J.J. Verm. & P. O'Byrne. A. Habit; B. Flower; C. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; D. Lip, left: adaxial side, right: abaxial side; E. Column and lip, lateral view; F. Anther, above: adaxial side, below: abaxial side. All from SBG-O 5051 (spirit sample).

acute. Anther abaxially with a rounded crest, surface approx. glabrous but papillose towards the tip, front margin drawn out, retuse, papillose. **Pollinia** (not seen).

Colour: Sepals dull pale yellowish, with dark red veins. Petals pale yellow with a blackish red tip. Lip whitish around the ligament, purplish red up to approx. half-way its length, top part orange.

Habitat & ecology: Found as an understory epiphyte in mossy montane forest. Alt. ca 1200-1400 m. Flowering Feb, Jul, Sep-Nov.

Distribution: INDONESIA. Sulawesi, central part (1 specimen seen).

Notes: Most similar to *B. valeryi* J.J. Verm. & P. O'Byrne, which differs in having ovate, acute petals and two large teeth at the base of the stigma. *B. caecum* J.J. Sm., and *B. pisibulbum* J.J. Sm., are also similar, but differ in having narrower sepals (index larger than 2) and longer pedicels (pedicel and ovary 12 mm or longer).

Group b - Species with creeping or more or less patent rhizome, clustered pseudobulbs of reduced size, and inflorescences approx. as long as or longer than the vegetative shoot they arise from. As in the previous group, the flowers are as in section *Fruticicola*, a section generally characterized by a patent or pendulous rhizome. However, J.J. Smith (1926, p. 59), under the description of *B. caecum* J.J. Sm., a species that would also fit in group b, has expressed the opinion that such species are best included in section *Fruticicola* nevertheless.

Bulbophyllum amaurolooma J.J. Verm. & P. O'Byrne, *sp. nov.*

Bulbophyllum amaurolooma J.J. Verm. & P. O'Byrne, in *sectione Polymeres combinatione pseudobulborum fastigiatorum, labelli pagina elliptica singularis*. -**Typus:** Indonesia, Sulawesi, central part, SBG-O 5244 (holo, SING). **Fig. 27.**

Roots below the pseudobulbs. **Rhizome** creeping or straggling at some distance from the substrate, 1.5-2 mm diam., sections between pseudobulbs 0.2-0.4 cm long, bracts not persistent. **Pseudobulbs** rather close together, obliquely erect, ovoid, 0.5-0.6 x 0.25-0.3 cm. Petiole up to 0.4 cm long. **Leaf blade** elliptic, 2-3.5 x 0.35-0.45 cm, index (length/width) 6.4-9.7; acute. **Inflorescence** 5-6 cm long, 1-flowered. Peduncle patent, 3-3.5 cm, bracts ca 2, the longest ca 3.5 mm long. Floral bract tubular, ca 2.5 mm, acute. **Flowers**

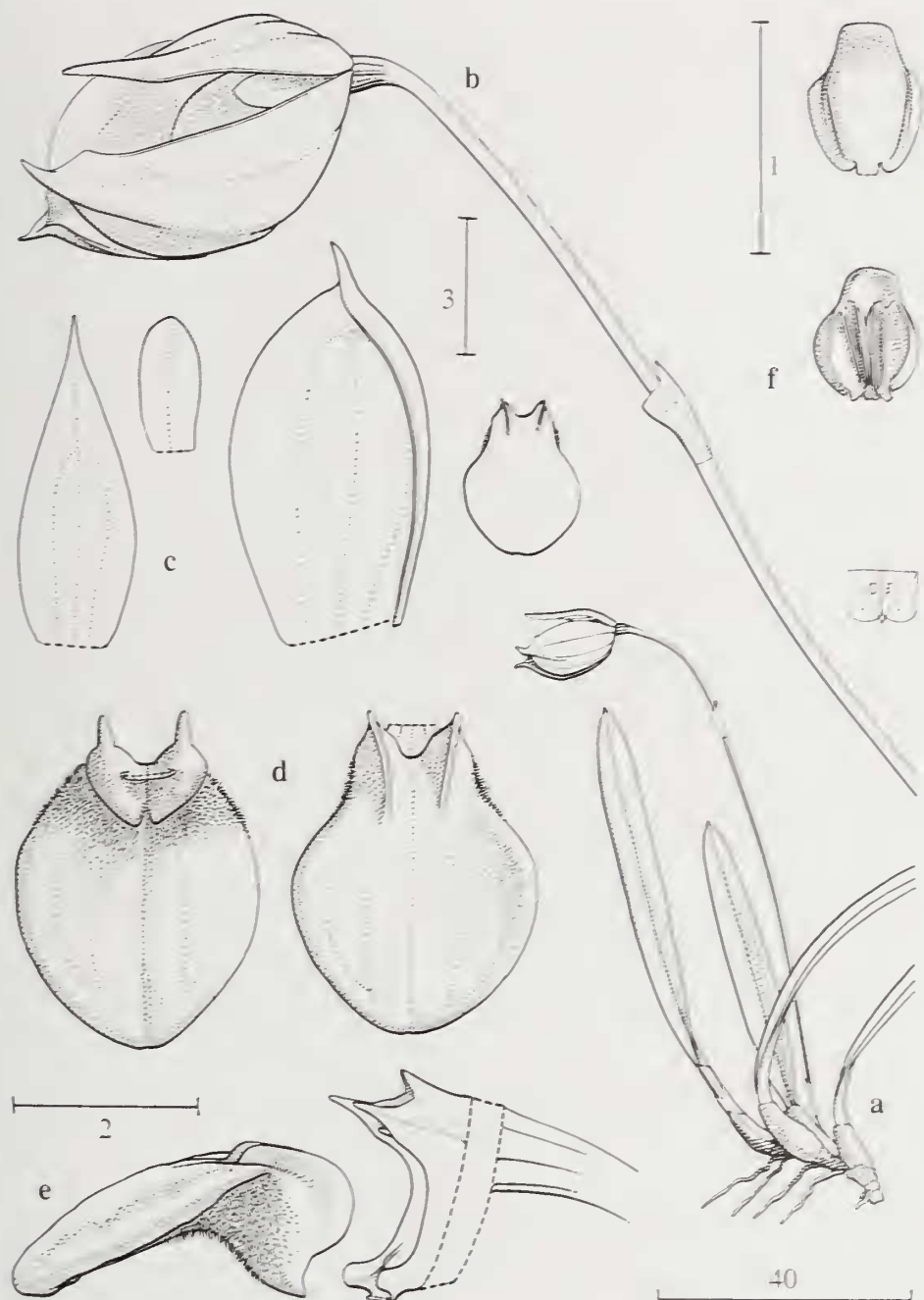


Figure 27. *Bulbophyllum amaurolooma* J.J. Verm. & P. O'Byrne. A. Habit; B. Flower; C. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; D. Lip, left: adaxial side, right: abaxial side; E. Column and lip, lateral view; F. Anther, above: abaxial side, below: adaxial side. All from SBG-O 5244 (spirit sample).

not fully opening. Pedicel and ovary ca 12 mm long, basal node on a ca 1.7 mm long stump. Median **sepal** recurved, ovate, ca 7.5 x 2.8 mm, index 2.6-2.7; acuminate, margins entire, slightly and very finely papillose, base rather narrowly attached; thin, surface glabrous. Lateral sepals free, oblique, elliptic-obovate, ca 9 x 5 mm, index ca 1.8; base rather broadly attached; otherwise as the median sepal. **Petals** porrect, elliptic-obovate, ca 3.2 x 1.5 mm, index 2.1-2.2; subacute, margins entire, finely papillose; base rather broadly attached; thin, surface approx. glabrous. **Lip** recurved at approx. 2/5 of its length, consisting of a short, rather narrow basal part and a wide, elliptic blade, ca 3.5 x 2.7 mm, index ca 1.3 (all without artificial spreading), rounded, margins entire, glabrous except for a short, ciliate stretch just above the base; thick and soft; adaxially concave near the base, with two rather high and narrow ridges starting at the base and running up, while slightly converging, to 1/3 of the length of the lip, top 2/3 approx. flat, adaxial surface glabrous; abaxially with a retuse ridge up to 1/4-1/3 of the length of the lip, surface glabrous except for a hairy patch just in front of the ridge. Column ca 1.5 mm long, stigma elliptic, without keels inside, without teeth at its base, column foot widened, with obtuse lateral teeth as well as a median cavity just above the ligament. Stelidia triangular, ca 0.7 mm long, acute. Anther abaxially with a large, rounded crest, surface finely papillose, front margin drawn out, round, papillose. **Pollinia** (not seen).

Colour: Sepals and petals yellow, the latter with red margins. Lip yellow in centre, red towards the margins. Column yellow.

Habitat & ecology: Found as an understory epiphyte in mossy montane forest. Alt. ca 1200-1400 m. Flowering Feb, Mar, Aug, Nov.

Distribution: INDONESIA. Sulawesi, central part (1 specimen seen).

Notes: Uniquely identified within section *Polymeres* by the combination of the clustered pseudobulbs and by the wide, elliptic blade of the lip.

Bulbophyllum croceodon J.J. Verm. & P. O'Byrne, *sp. nov.*

A Bulbophyllo stylocoryphe sepalis lateralibus et petalis ac labello latioribus, labelli parte apicali extensa, sed non contracta ante dilationem in apice globoso differt. – **Typus**: Indonesia, Sulawesi, central part, SBG-O 4539 (holo, SING). **Fig. 28.**

Roots below the pseudobulbs. **Rhizome** creeping, 1.5-2 mm diam., sections between pseudobulbs 0.2-0.4 cm long, bracts not persistent. **Pseudobulbs**

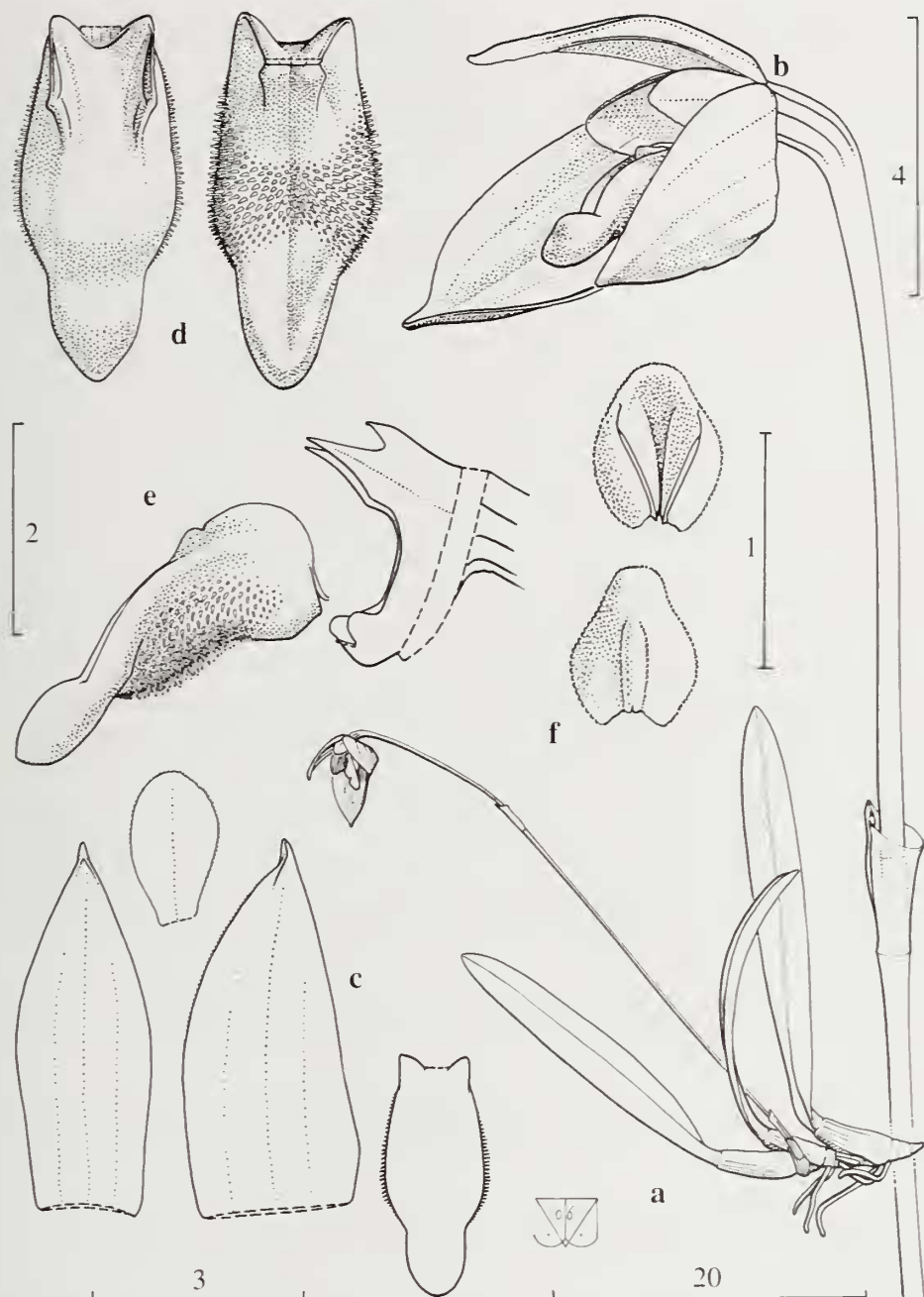


Figure 28. *Bulbophyllum croceodon* J.J. Verm. & P. O'Byrne. A. Habit; B. Flower; C. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; D. Lip, left: adaxial side, right: abaxial side; E. Column and lip, lateral view; F. Anther, above: adaxial side, below: abaxial side. All from SBG-O 4539 (spirit sample).

rather close together, almost porrect to obliquely erect, ovoid, 0.4-0.6 x 0.2-0.3 cm. Petiole up to 0.2 cm long. **Leaf** blade elliptic to (ob-)ovate, 1.7-2.7 x 0.3-0.35 cm, index (length/width) 5-9; subacute. **Inflorescence** ca 4 cm long, 1-flowered. Peduncle patent, ca 2.7 cm, bracts 3, the longest ca 3 mm long. Floral bract tubular, ca 2.8 mm, acute. **Flowers** not fully opening. Pedicel and ovary ca 13 mm long, basal node on a ca 2 mm long stump. Median **sepal** recurved, ovate, ca 5.5 x 2 mm, index 2.7-2.8; shortly acuminate, margins entire, base rather broadly attached; rather thin, glabrous. Lateral sepals free, oblique, ovate-triangular, ca 5.5 x 2.5 mm, index ca 2.2; acute, base broadly attached; upper margin finely papillose; otherwise as the median sepal. **Petals** porrect, obovate, ca 2.2 x 1.2 mm, index ca 2; rounded, margins finely crose and finely papillose; base rather narrowly attached; thin, surface glabrous. **Lip** recurved near its base, obovate, with a drawn-out ovate top part, ca 3.4 x 1.6 mm, index 2.1-2.2 (all without artificial spreading); obtuse, margins entire, papillose except near the top part; thick and soft; adaxially concave near the base, with two rather high and narrow ridges starting at the base, near the margins, and running up, while slightly converging, to *c.* $\frac{1}{3}$ of the length of the lip, and ending with a small, erect, rounded tooth, middle $\frac{1}{3}$ approx. flat, top $\frac{1}{3}$ distinctly convex, adaxial surface glabrous; abaxially with a retuse ridge up to $\frac{1}{4}$ of the length of the lip, surface glabrous except for a long-papillose patch approx. half-way along the length of the lip. Column ca 1.6 mm long, stigma elliptic, without keels inside, without teeth at its base, column foot widened, with ovate, obtuse lateral teeth as well as a median swelling just above the ligament. Stelidia triangular, ca 0.8 mm long, acute, with a slight, deltoid, obtuse wing along the lower margin. Anther abaxially with a large, rounded crest, surface finely papillose, front margin drawn out, rounded, papillose. **Pollinia** (not seen; anther under-developed in the flower available).

Colour: Flowers yellow. Front part of the ridges on the adaxial side of the lip orange.

Habitat & ecology: Found as an understory epiphyte in montane forest with small pole trees, only thinly mossy. Alt. ca 1000 m. Flowering Jun, Jul, Oct.

Distribution: INDONESIA. Sulawesi, central part (1 specimen seen).

Notes: Similar to *B. stylocoryphe*, mainly different in the wider lateral sepals, petals and lip. Also, the top part of the lip is drawn out, but not contracted before widening into a globose tip, as in *B. stylocoryphe*.

Bulbophyllum stylocoryphe J.J. Verm. & P. O'Byrne, *sp. nov.*

A *Bulbophyllis* *croceodon*, *B. elodeifloro*, *B. gilvo* *et* *B. ischnopodus labelli* *apice elongata, quod adducens ante dilatatione in apicem globosam differt.*

— **Typus:** Indonesia, Sulawesi, central part. *SBG-O 5054* (holo. SING). **Fig. 29.**

Roots below the pseudobulbs. **Rhizome** (short-) creeping or straggling at some distance from the substrate, 1.2-1.5 mm diam., sections between pseudobulbs 0.2-0.3 cm long, bracts not persistent. **Pseudobulbs** rather close together, almost porrect to obliquely erect, ovoid to almost cylindrical, 0.6-0.9 x 0.2-0.25 cm. Petiole up to 0.3 cm long. **Leaf** blade elliptic, 2-3.5 x 0.25-0.35 cm, index (length/width) 8-10; obtuse. **Inflorescence** ca 5 cm long, 1-flowered. Peduncle patent, ca 3.2 cm, bracts ca 2, the longest ca 3 mm long. Floral bract tubular, ca 2.8 mm, acute. **Flowers** not fully opening. *Pedicel* and *ovary* c. 12 mm long, basal node on a ca 1.3 mm long stump. Median **sepal** recurved, ovate, ca 6.5 x 2.2 mm, index 2.9-3; shortly acuminate, margins entire, base rather narrowly attached; rather thin, glabrous. Lateral sepals free, oblique, triangular, ca 6.5 x 2.5 mm, index ca 2.6; acute, base rather broadly attached; upper margin finely papillose; otherwise as the median sepal. **Petals** porrect, obovate, ca 2 x 1 mm, index ca 2; rounded, margins finely erose; base rather broadly attached; rather thin, surface glabrous. **Lip** recurved near its base, elliptic-obovate, narrowed distally but with a swollen, globose tip, ca 4.1 x 1.4 mm, index 2.9-3 (all without artificial spreading), rounded, margins entire, glabrous except for a short, ciliate stretch just above the base; thick and soft; adaxially concave near the base, with two rather high and narrow ridges starting at the base, near the margins, and running up, while slightly converging, to $\frac{1}{4}$ - $\frac{1}{3}$ of the length of the lip and ending with an erect, deltoid, subacute tooth, top $\frac{2}{3}$ slightly convex but tip distinctly convex, adaxial surface glabrous; abaxially with a retuse ridge up to $\frac{1}{4}$ of the length of the lip, surface glabrous except for a hairy patch in front of the ridge. Column ca 1.4 mm long, stigma elliptic, without keels inside, without teeth at its base, column foot widened, with triangular, obtuse lateral teeth as well as a median swelling just above the ligament. Stelidia triangular, ca 0.8 mm long, acute, with a slight, deltoid, obtuse wing along the lower margin. Anther abaxially with a large, rounded crest, surface finely papillose, front margin drawn out, rounded, papillose. **Pollinia** 4, ovate; the inner slightly shorter than the outer, flat; a fleshy appendage is present.

Colour: Flowers yellow. Crest of the ridges on the adaxial side of the lip orange yellow.

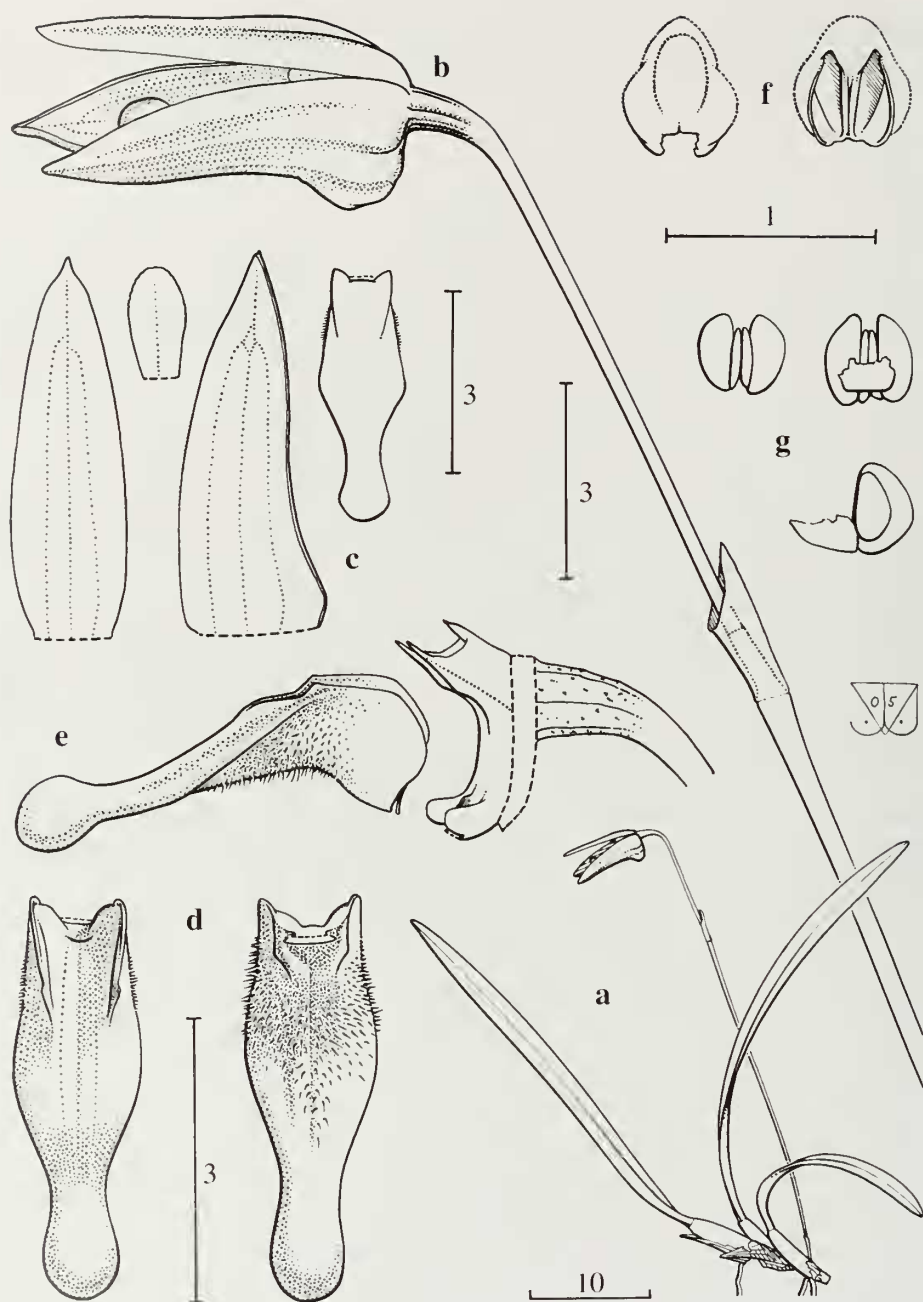


Figure 29. *Bulbophyllum stylocoryphe* J.J. Verm. & P. O'Byrne. A. Habit; B. Flower; C. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; D. Lip, left: adaxial side, right: abaxial side; E. Column and lip, lateral view; F. Anther, left: abaxial side, right: adaxial side; G. Pollinia, left: two pairs, right: two pairs with appendage, below: a single pair with appendage. All from SBG-O 5054 (spirit sample).

Habitat & ecology: Found as an understory epiphyte in mossy montane forest. Alt. ca 1200-1400 m. Flowering Feb, Apr. Jul, Oct, Nov.

Distribution: INDONESIA. Sulawesi, central part (1 specimen seen).

Notes: In general habit and flower shape this is most similar to *B. elodeiflorum* J.J. Sm., *B. gilvum* J.J. Verm., and *B. ischnopus* Schltr., but none of these species have the globose lump at the tip of the lip.

Group c - Species with a creeping rhizome, clustered or distant pseudobulbs of substantial size, and inflorescences approx. as long as the vegetative shoot they arise from.

The group agrees with sect. *Megaloglossum*. Other species found in Sulawesi to be included here are *B. tenuifolium* (Bl.) Lindl., and *B. spissum* J.J. Verm.

Bulbophyllum entobaptum J.J. Verm. & P. O'Byrne, *sp. nov.*

A Bulbophyllis aestivali et *B. cubico* *labello parte apicali angustiore, carinis in pagina adaxiali e basi ad 3/5-plo labelli longitudine et a B. graciliscapum petalis obtusis differt.* - **Typus:** Indonesia, Sulawesi, central part, SBG-O 5050 (holo, SING). **Fig. 30.**

Roots below the pseudobulbs. **Rhizome** creeping, 1-1.5 mm diam., sections between pseudobulbs 0.2-0.6 cm long, bracts not persistent. **Pseudobulbs** clustered, approx. erect, ovoid, 0.7-1.4 x 0.4-0.8 cm. Petiole 0.2-0.5 cm long. **Leaf** blade elliptic to ovate, 3.3-4.3 x 0.7-1.1 cm, index (length/width) 3.4-4.8, acute. **Inflorescence** ca 6 cm long, 1-flowered. Peduncle erect, 5-5.5 cm, bracts ca 3, the longest ca 3 mm long. Floral bract tubular, ca 1.5 mm, acute. **Flowers** not fully opening. Pedicel and ovary ca 10 mm long, basal node on a ca 0.6 mm long stump. Median **sepal** approx. porrect, ovate, ca 8.5 x 4.5 mm, index 1.8-1.9; acute, margins ciliate, base rather broadly attached; rather thin, glabrous. Lateral sepals free, recurved, oblique, ovate-triangular, ca 8.5 x 3.5 mm, index 2.4-2.5, margins entire, glabrous, base broadly attached; otherwise as the median sepal. **Petals** porrect, ovate, ca 5.5 x 2.1 mm, index ca 2.6; obtuse, margins approx. entire, ciliate; base narrowly attached; thin, surface approx. glabrous. **Lip** somewhat recurved approx. half-way along its length, general outline ovate, ca 6 x 1.8 mm, index 3.3-3.4 (all without artificial spreading), obtuse, margins papillose in the proximal half, thick; adaxially slightly concave near the base, with two narrow ridges starting near the margins at the base, then converge up to about 1/3 of the length of the lip, then diverge a little towards their end at about 3/5 of the length of the lip, top 2/5 convex, adaxial surface

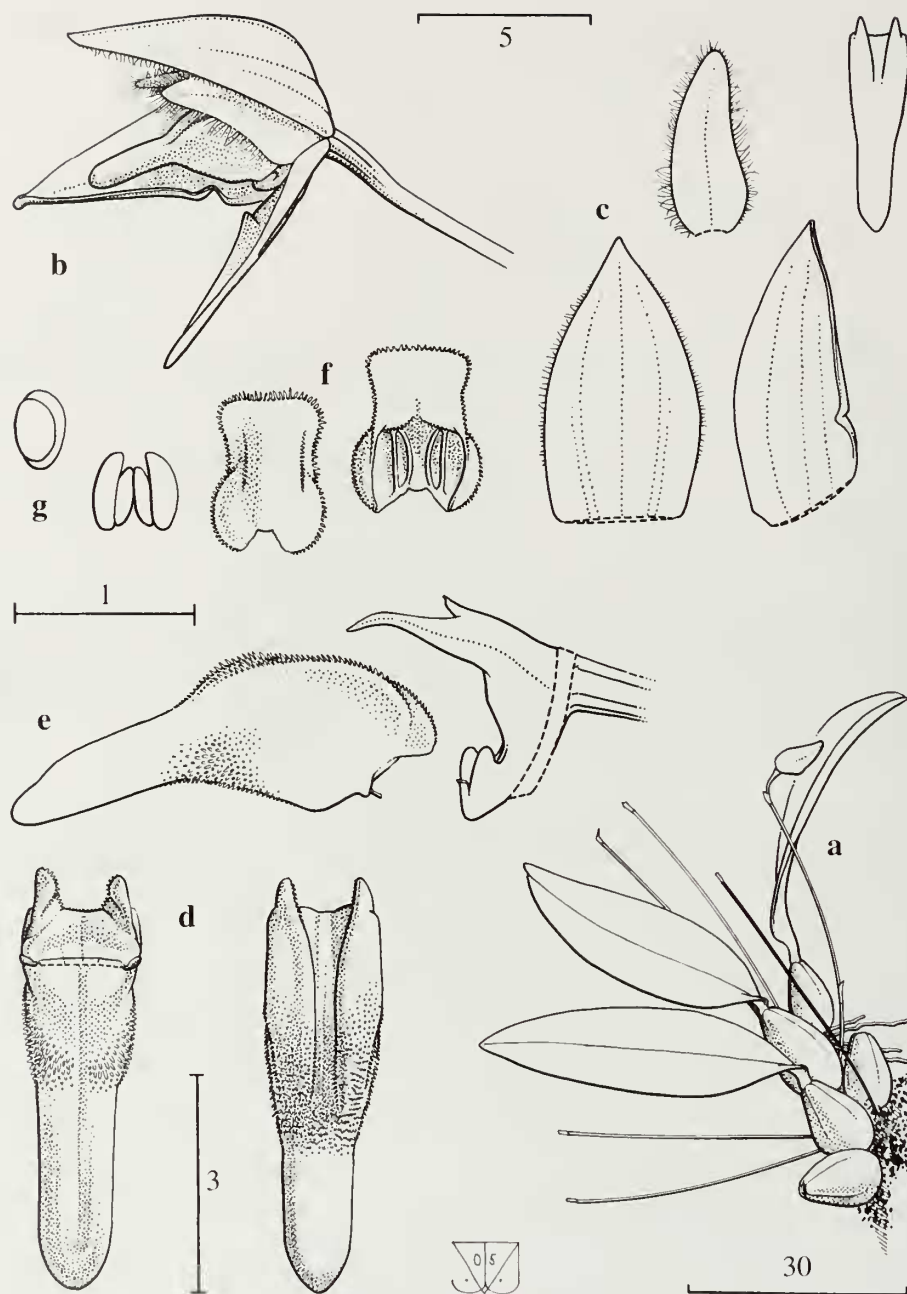


Figure 30. *Bulbophyllum entobaptum* J.J. Verm. & P. O'Byrne. A. Habit; B. Flower; C. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; D. Lip, left: adaxial side, right: abaxial side; E. Column and lip, lateral view; F. Anther, left: abaxial side, right: adaxial side; G. Pollinia, left: a single pair, right: two pairs. All from SBG-O 5050 (spirit sample).

papillose in the middle third of the length of the lip, with the papillae joined to irregular transverse, antrorse ridgelets, towards the base of the lip these papillae become finer, top part glabrous; abaxially with a truncate ridge up to $\frac{1}{2}$ of the length of the lip, surface with a transverse papillose strip about half-way along the length of the lip. Column ca 3 mm long, stigma semi-elliptic, without keels inside, with a callus at its base, column foot widened and thickened, with thick, retrorse, semi-elliptic, rounded lateral teeth just above the ligament. Stelidia curved, triangular-subulate, ca 1.8 mm long, acute. Anther abaxially with a flattened crest, surface papillose-hirsute, front margin drawn out, truncate, papillose-hirsute. **Pollinia** 4, ellipsoid; the inner $\frac{3}{4}$ as long as the outer.

Colour: Sepals and petals straw yellow, adaxially with numerous blackish red dots. Lip blackish red.

Habitat & ecology: Found as an understory epiphyte on twigs in mossy montane forest. Alt. 1200-1400 m. Flowering Feb, Apr-Nov.

Distribution: INDONESIA. Sulawesi, central part (1 specimen seen).

Notes: A small group of similar looking species with ciliate petals and a more or less ciliate median sepal exists, all originating from the Philippines: *B. aestivale* Ames and *B. cubicum* Ames have a lip with much shorter keels proximally on the adaxial side, and a wider top part; *B. graciliscapum* Ames & Rolfe, has acute-acuminate petals and a glabrous lip.

Bulbophyllum fionae J.J. Verm. & P. O'Byrne, *sp. nov.*

A *Bulbophyllo elassoglossum floribus minoribus* (sepala 24 mm longa, petala 10 mm longa in *B. elassoglossum*), *labello adaxialiter glabro* et *B. entobaptum sepalo mediano glabro, petalis brevioribus latioribusque differt.* – **Typus:** Indonesia, Sulawesi, central part, SBG-O 4345 (holo, SING). Fig. 31.

Roots below the pseudobulbs. **Rhizome** creeping, 1-1.5 mm diam., sections between pseudobulbs 0.2-0.3 cm long, bracts not persistent. **Pseudobulbs** clustered, approx. erect, ovoid, 0.7-0.8 x 0.4-0.5 cm. Petiole 0.2-0.3 cm long. **Leaf** blade elliptic to ovate, 2.5-2.8 x ca 0.7 cm, index (length width) 3.5-4; acute. **Inflorescence** ca 3.5 cm long, 1-flowered. Peduncle erect, 2-3 cm, bracts ca 3, the longest ca 2.5 mm long. Floral bract tubular, 1.5-2 mm, acute. **Flowers** not fully opening. Pedicel and ovary ca 10 mm long, basal node on a ca 0.5 mm long stump. Median sepal approx. porrect, elliptic, ca 7 x 4.5 mm, index 1.5-1.6; obtuse-apiculate, margins entire, base narrowly attached; thin, glabrous. Lateral sepals free, recurved, oblique, ovate-triangular, ca 7 x

4 mm, index 1.7-1.8, base broadly attached; otherwise as the median sepal. **Petals** porrect, ovate, ca 4 x 2.5 mm, index ca 1.6; rounded, margins slightly erose towards the tip, sparsely ciliolate towards the base; base narrowly attached; thin, surface approx. glabrous. **Lip** somewhat recurved about half-way along its length, general outline oblong, ca 5 x 1.8 mm, index ca 2.7-2.8 (all without artificial spreading), obtuse, margins sparsely and shortly ciliolate in the proximal half, thick, surface glabrous; adaxially distinctly concave in the proximal $\frac{2}{3}$ of its length, bordered by two rather high and narrow ridges starting at the base, and running up, close to the margin and slightly converging, to about $\frac{2}{3}$ of the length of the lip, top $\frac{1}{3}$ convex; abaxially with a truncate ridge up to $\frac{1}{2}$ of the length of the lip. Column ca 3 mm long, stigma semi-elliptic, without keels inside, with a thick callus at its base, column foot widened and thickened, with thick, retrorse, semi-elliptic, rounded lateral teeth just above the ligament. Stelidia curved, subulate, ca 1.8 mm long, acute, with an antrorse, triangular, obtuse tooth along the upper margin. Anther abaxially with a rounded crest near its base, surface papillose, front margin drawn out, widely round, papillose. **Pollinia** 4, ellipsoid; the inner $\frac{3}{4}$ as long as the outer.

Colour: Sepals and petals pale yellow, adaxially densely spotted with purplish red. Lip orange red, white near the base.

Habitat & ecology: Found as an understory epiphyte in montane forest near a stream. Alt. ca 1000 m. Flowering Jan.

Distribution: INDONESIA. Sulawesi, central part (1 specimen seen).

Notes: Morphologically, *B. fionae* seems most similar to *B. elassoglossum* Siegerist. This has, however, much larger flowers (sepals 24 mm long, petals 10 mm long) and a lip which is papillose abaxially. *B. entobaptum* differs in having a ciliolate median sepal, longer and narrower, long-ciliate petals and a partly papillose lip.

Named after Fiona, granddaughter of Yunus, driver in Rantepao, Sulawesi.

***Bulbophyllum* sect. *Schistopetalum* Schltr.**

Bulbophyllum sect. *Schistopetalum* Schltr., Feddes Repert. Beih. 1 (1913) 700 & 763. – LECTOTYPE SPECIES (here designated): *Bulbophyllum schistopetalum* Schltr.

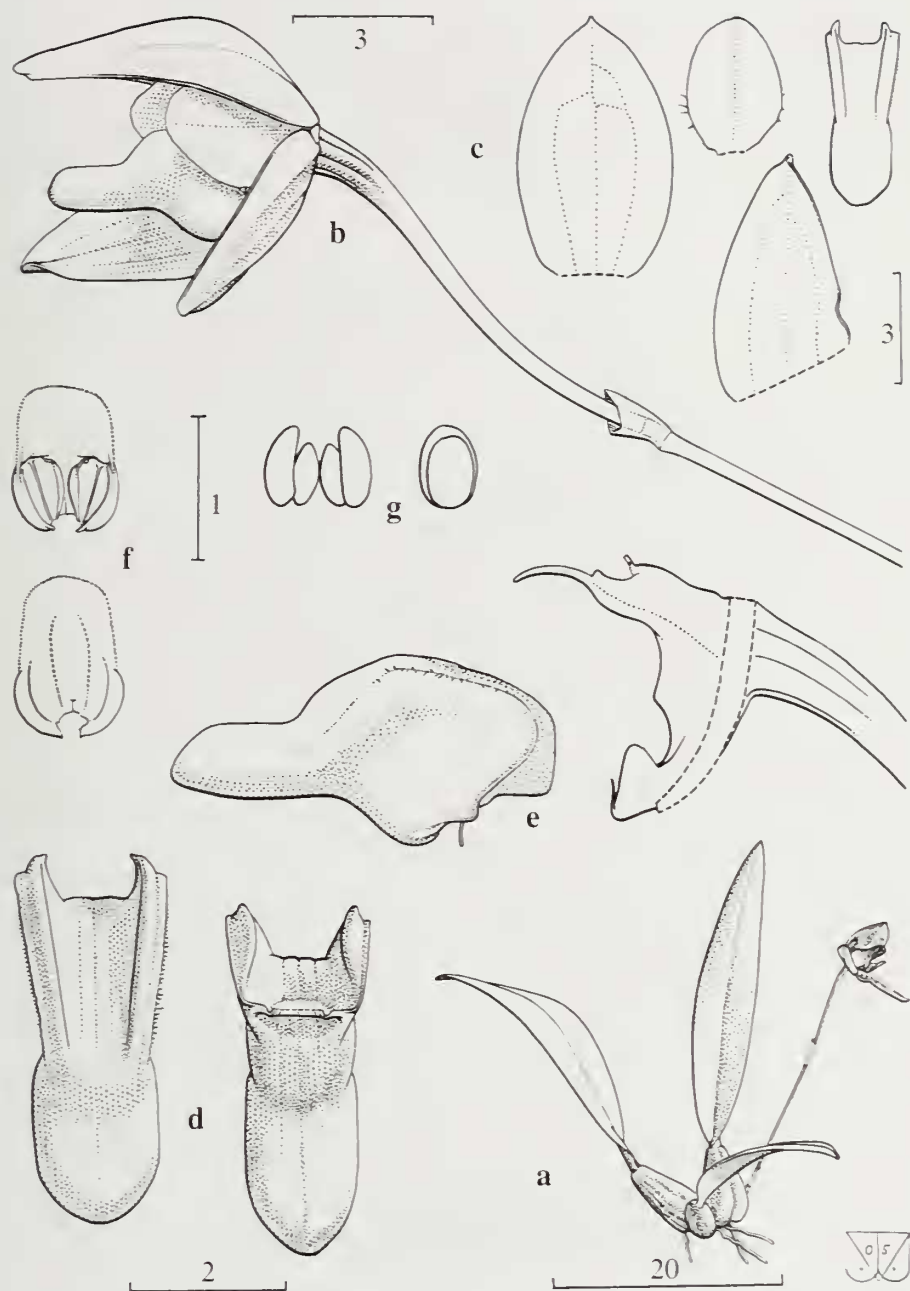


Figure 31. *Bulbophyllum fionae* J.J. Verm. & P. O'Byrne. A. Habit; B. Flower; C. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; D. Lip, left: adaxial side, right: abaxial side; E. Column and lip, lateral view; F. Anther, above: adaxial side, below: abaxial side; G. Pollinia, left: two pairs, right: a single pair. All from SBG-O 4345 (spirit sample).

Bulbophyllum barbasapientis J.J. Verm. & P. O'Byrne, *sp. nov.*

Bulbophyllum barbasapientis J.J. Verm. & P. O'Byrne, *ab omnibus sect. Epicranthes petalorum appendices quae texturam eadem atque in petalis propriis, labelli parte apicali dense pubescenti, ab omnibus speciebus sect. Schistopetali stelidiis brevibus differt.* — **Typus:** Indonesia, Sulawesi, central part, SBG-O 4920 (holo, SING). **Fig. 32.**

Roots mostly produced close to the base of the rhizome. **Rhizome** patent to hanging, ca 10 cm long, 1-2 mm diam., sections between pseudobulbs 0.7-1.6 cm long, bracts persistent. **Pseudobulbs** well spaced, ellipsoid to obovoid, 0.7-1.4 x 0.2-0.6 cm. Petiole 0.1-0.2 cm long. **Leaf** blade elliptic, 2.7-3.8 x 0.9-1.7 cm, index (length/width) 1.8-3.8; round to obtuse. **Inflorescence** ca 1.3 cm long, 1-flowered. Peduncle porrect, ca 0.4 cm, bracts 3, the longest ca 4 mm long. Floral bracts tubular at the base, ca 3 mm, acute. **Flowers** opening wide. Pedicel and ovary ca 5 mm long, basal node on a ca 1.5 mm-long stump. Median **sepal** spreading, ovate, ca 5.5 x 3 mm, index 1.8-1.9; acute, margins entire, base narrowly attached; thick, glabrous. Lateral sepals ca 5.5 x 3.3 mm, index 1.6-1.7; base broadly attached; otherwise as the median sepal. **Petals** porrect, approx. lyriform, ca 1.4 x 1.6 mm excluding appendages, index 0.8-0.9; margins with 7 appendages, base broadly attached; thin, glabrous; appendages linear, 1.3-1.8 x ca 0.1 mm, gradually tapering towards an acute tip, otherwise as the petals themselves. **Lip** slightly but abruptly recurved near the base, approx. triangular, ca 3.5 x 1 mm, index ca 3.5 (all without artificial spreading); top slightly drawn out, tip subacute, margins entire, ciliate along a section near the base; thick; adaxially deeply concave proximally and with two distinct, rounded ridges starting at the base, immediately converging and then running parallel, close together up to $\frac{1}{4}$ - $\frac{1}{3}$ of the length of the lip, where they are clasped between, and fused to the margins which converge over the adaxial surface of the lip, then running close together and parallel over another $\frac{1}{3}$ of the length of the lip, surface convex distally, with densely placed, woolly, long hairs; abaxially with a wide, retuse ridge up to $\frac{1}{4}$ - $\frac{1}{3}$ of the length of the lip, surface glabrous but with long hairs towards the sides. Column ca 1.7 mm long, stigma obovate, without a tooth at its base, column foot without teeth near the tip. Stelidia porrect, triangular, ca 0.4 mm long, acute, with a denticulate upper margin, with a distinct, deltoid, subacute tooth which has the front margin folded inwards along the lower margin, and a minute tooth in front of this. Anther abaxially with a weak crest, surface otherwise finely papillose towards the tip, front margin drawn out into a retuse beak with approx. entire margins. **Pollinia** 2, ellipsoid, without appendage.

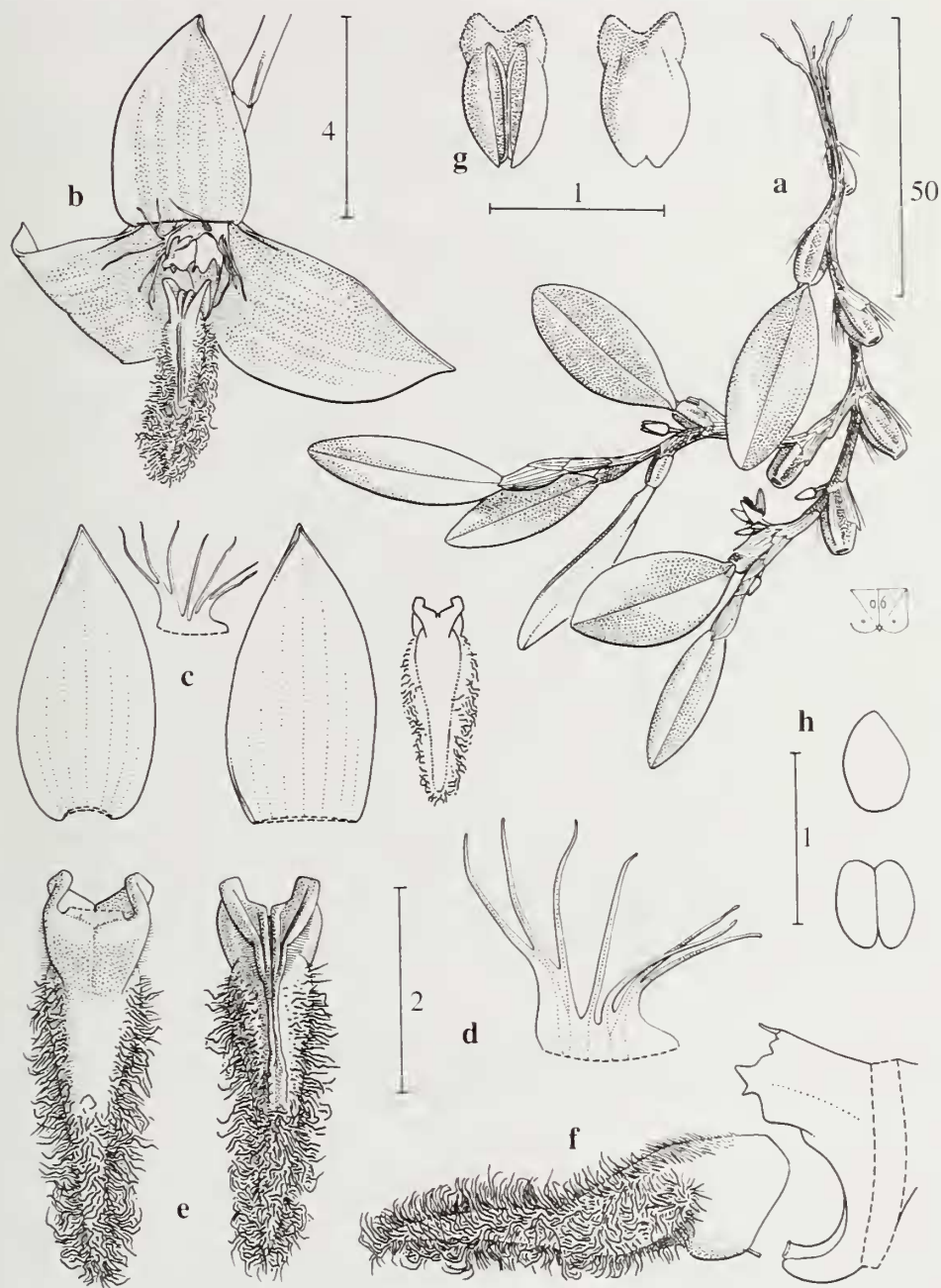


Figure 32. *Bulbophyllum barbasapiensis* J.J. Verm. & P. O'Byrne. A. Habit; B. Flower; C. Flower analysis, from left to right: median sepal, petal, lateral sepal, lip; D. Lip, left: adaxial side, right: abaxial side; E. Column and lip, lateral view; F. Column and lip, lateral view; G. Anther, left: adaxial side, right: abaxial side; H. Pollinia, above: a single, below: a pair. All from SBG-O 5052 (spirit sample).

Colour: Leaves dark green, suffused with purplish red. Sepals and lip purplish red. Petals white, tips of filaments yellow. Column pale greenish.

Habitat & ecology: Epiphyte in montane riverine forest. Alt. ca 1000 m. Flowering Jun, Aug-Nov.

Distribution: INDONESIA. Sulawesi, central part (1 specimen seen).

Notes: While fitting perfectly into section *Epicranthes* in most aspects, *B. barbasapientis* is included in sect. *Schistopetalum* because the appendages on the petals have the same texture as the petal itself. In sect. *Epicranthes* the appendages have a texture differing from that of the petal. The configuration of the keels on the lip in *B. barbasapientis* is typical for sect. *Schistopetalum*; in section *Epicranthes* a similar but less distinct structure occurs. Within section *Schistopetalum*, *B. barbasapientis* combines the lip shape of *B. schistopetalum* Schltr with the short sepals of *B. fissipetalum* Schltr. It differs from all species so far attributed to sect. *Schistopetalum* by its short stelidia (as in sect. *Epicranthes*).

B. barbasapientis is a morphological link between section *Epicranthes* and section *Schistopetalum*. The latter includes species with a more or less pendulous rhizome (as in section *Epicranthes*) as well as species with a creeping rhizome. The petals are deeply divided (as in sect. *Epicranthes*) in most species, but with only 3 short appendages in *B. trigonidioides* J.J. Sm., and with a single caudate tip in *B. filamentosum* Schltr. Species like *B. hassalii* Kores, *B. distichobulbum* Cribb, and *B. aristopetalum* Kores, make complete the morphological grading of section *Epicranthes* into the genus *Bulbophyllum* in a wide sense.

***Bulbophyllum* sect. *Stachysanthes* (Bl.) J.J. Verm. & P. O'Byrne, comb. nov.**
(= sect. *Aphanobulbon*)

Diphyes sect. *Stachysanthes* Bl., Bijdr. Fl. Ned. Ind. (1825) 312. – LECTOTYPE SPECIES, designated here: *Diphyes gibbosa* Bl. [= *B. gibbosum* (Bl.) Lindl.].

Diphyes sect. *Diptychanthes* Bl., Bijdr. Fl. Ned. Ind. (1825) 311. – TYPE SPECIES: *Diphyes mutabilis* Bl. [= *B. mutabile* (Bl.) Lindl.].

Bulbophyllum sect. *Aphanobulbon* Schltr., Feddes Repert. 10 (1912) 181; Feddes Repert. Beih. 1 (1913) 704, 874. – LECTOTYPE SPECIES (here designated): *Bulbophyllum gibbosum* (Bl.) Lindl.

Not *Bulbophyllum* sect. *Diptychanthes* Rchb.f. in Bonplandia 5 (1857) 57. –
TYPE SPECIES: *Bulbophyllum salaccense* Rchb.f.

Further synonymy, as well as a selection of species included can be found in Vermeulen (1991), under sect. *Aphanobulbon*.

Acknowledgements

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